



MISSILE & SPACE SYSTEMS DIVISION DOUGLAS AIRCRAFT CO., INC.

ENGINEERING LABORATORIES & SERVICES

TECHNICAL MEMORANDUM			
TO:	R. M. Gunn, A3-860	CATALOG NO. PDL 81272	
FROM:	J. P. Loef, A-270	REPORT NO. TM-DSV4B-ENV-R5924 Rev A	
SUBJECT: COPIES TO:	LO2 CHILLTOWN SYSTEM SHUTOFF VALVE, SCN 1A49965-521, FORMAL QUALIFICATION TEST J. H. Brettnacher, G. R. Schroeder, I. M. Williamson, A-270; P. Sellers, A2-260; J. C. Byers, J. Hilman, F. S. Mayer, Jr., E. T. Oddo, J. K. Janoung, R. P. Shepherd, V. B. Thomas, C. R. Tiedeman, D. L. Trader,	DATE28 April_ 1967	
A3*860; C.W. Wilson, A3-860(16) CLASSIFICATION OR RESTRICTION: Wilson, A3-860(16) PREPARED BY: APPROVED BY: A			
ABSTRACT:			
This document details the tests performed by Beech Aircraft Corporation,			
Boulder, Colorado, for the Douglas Aircraft Company, Inc., on the IO2			
	Chilldown System Shutoff Valve, Specification	on Control Drawing 1A49965-521,	
	Revision Y. Testing was discontinued upon	completion of the vibration and	
	mechanical shock tests due to excessive internal actuator leakage. The		

valve had satisfactorily completed pre-test inspection, proof pressure, leakage, functional, and repeat cycle prior to the post vibration and sbock leakage-test failure.

> DESCRIPTORS Saturn S-IVB/V LO2 Valve Chilldown .

> > Shutoff.

(THRU) none (CODE)

(NASA CR OR TMX OR AD NUMBER)

(CATEGORY)

OTOM ZC	3-600 (3-67)				
CHG LTR	DATE REVISED	PAGES REVISED	BRIEF DESCRIPTION OF CHANGE AND REASON	REVISED BY	APPROVED BY
A l	7/21/67	D-12	Added accelerometer numbers; 1,2,3,4,5,6, and 7	GR. Schuz	J.J. Bristlinech G.J.J. Land
		D-13	Added note, description of accelerometers		
		D-14	Same as D-13		
- and an analysis of the second		D-15	Same as D-13		
		D-1 6	Same as D-13 Added: Radial axis Accelerometer #1		
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PREFACE

This report was prepared by the Douglas Aircraft Company, Inc., for the National Aeronautics and Space Administration, Marshall Space Flight Center, under Contract NAS7-101 and contains detailed information concerning the testing of the LO₂ Chilldown System Shutoff Valve, Specification Control Drawing 1.49965-521, Revision Y.

The test specimen was subjected to an inspection and to non-destructive environmental tests; i.e: pre-test inspection, proof, leakage, functional, cycling (low, high, and ambient temperature), and vibration and mechanical shock. The specimen failed the leakage tests which followed vibration and shock. This failure is reported in Douglas Failure and Rejection Report /151137.

All functional and environmental tests were witnessed by a representative of Douglas Quality Control. These tests were conducted by the Beech Aircraft Corporation, at Boulder, Colorado, during the period from October 12, 1966 to October 31, 1966. Teardown inspection and failure analysis were conducted at Fairchild-Hiller, Manhattan Beach, California.

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1.0 INTRODUCTION

1.1 Purpose of Test

The purpose of this formal qualification test was to demonstrate to the National Aeronautics and Space Administration, Marshall Space Flight Center, the ability of the LO₂ Chilldown System Shutoff Valve, Specification Control Drawing 1A49965-521, Revision Y, to meet the requisites of Test Requirements Drawing 1T07782, Revision C, when tested according to Test Procedure 1T07783, Revision D.

The tests were authorized under Formal Qualification Test Program SM-46532, Item FQ-F-146, and General Test Plan SM-41412, Item FQ-F-146.

1.2 Description

The LO₂ Chilldown System Shutoff Valve, Douglas F/N LA49965-521, shown on addendum pages B-1 and B-2, is a normally open, pneumatically operated valve. It has one inlet and one outlet port, two sensing ports on the outlet side, and an actuation pressure port. An electrical connector, with leads to internally mounted switches, gives indication of valve position to the logic and fail-safe control circuits.

The valve is located between Douglas stations 150 and 160 of the DSV-4B IVB stage of the Saturn IB/V space flight vehicle.

1.3 Function

The valve is used to shut off the flow of liquid oxygen in the chilldown system during firing of the stage engines or during fail conditions. Actuation of the valve is effected by a helium control module that is controlled by logic and fail-safe signals.

2.0 TEST SPECIMEN, EQUIPMENT, AND INSTRUMENTATION

2.1 Test Specimen

One Production LO₂ Chilldown System Shutoff Valve Assembly, identified as follows:

2.1 Test Specimen (Cont'd)

Douglas part number 1A49965-521, Revision Y

Vendor - Fairchild-Hiller, Manhattan Beach, California

Vendor part number 64-401-05

Vendor serial number 0201

Specimen number 1

2.2 Equipment and Instrumentation

A detailed list of the actual equipment and instrumentation used is included as Addendum E of this report. Test equipment and instrumentation used in performance of the test were current in certification and were within the tolerances specified in the test requirements drawing.

3.0 TEST REQUIREMENTS

3.1 Environmental Tolerances

The maximum allowable deviations from the applicable environmental requirements were as follows unless otherwise specified:

a.	Temperature .	<u>+</u> 10°F (below -100°F) <u>+</u> 5°F (-100° to +250°F)
b.	Altitude	+5% (equivalent feet)
c.	Humidity	+5%, -0%
đ.	Vibration (Sinusoidal)	±5% frequency ±10% amplitude
e.	Shock	+15% amplitude +20% duration
f.	Pressure	<u>+</u> 3% psig static <u>+</u> 5% psig dynamic
g.	Flow	±10% pounds per second
h.	Acceleration	<u>+</u> 10% gradient
i.	Load	±5% of applied load
j.	Angularity	<u>+</u> 0.5 degree
k.	Linearity	<u>+</u> 1% stroke
1.	Vibration (Random)	± 3 db when measured with a 50 cps filter

3.2 <u>Instrumentation Tolerances</u>

The maximum allowable error for the measurement equipment used in the test program was as follows unless otherwise specified:

a. Temperature $\pm 5^{\circ}F$ (Below -100°F) $\pm 2^{\circ}F$ (-100° to +250°F)

b. Altitude <u>+2%</u>
c. Humidity +2%

d. Vibration ±2.5% frequency +8% amplitude

e. Shock <u>+12% amplitude</u> +10% duration

f. Pressure ±1.5% psig static ±3.0% psig dynamic

g. Flow +5% pounds per second

h. Angularity ±0.25 degree
i. Linearity ±0.5% stroke

3.3 Standard Conditions

3.3.1 Ambient Room Conditions

Unless otherwise specified, all tests were conducted at ambient room conditions. Ambient room conditions are defined as follows:

a. Temperature 70 (±25) F

b. Relative Humidity 90% or less

c. Pressure 30 (±2) inches Hg

When tests were performed at conditions different from the above values, proper allowance, when necessary, was made in the test results for the difference in the system condition. Ambient room conditions were recorded periodically during each test.

3.4 Temperature Stabilization

Stabilized temperature is defined as the state at which further temperature change occurs at a rate no greater than $1^{\circ}F$ per minute.

3.4 Temperature Stabilization (Cont'd)

When tests were conducted at temperatures lower than $-250^{\circ} F$, the IO_2 Chilldown System Shutoff Valve was temperature stabilized by flowing the test medium or an acceptable substitute through the interior of the specimen.

4.0 TEST PROCEDURE

The following list specifies the tests that were performed and the sequence of that performance. Proof pressure, leakage, functional, flow, and electrical tests were performed whenever specified in the test procedure. All authorized engineering changes had been incorporated in the procedure at the time of testing.

Tests and Test Sequences:

- a. Pre-test Inspection
- b. Proof Pressure Test
- c. Leakage Test
- d. Functional Test (including electrical tests)
- e. Repeat Cycle Tests
- f. Vibration Test
- g. Mechanical Shock Test

4.1 Pre-test Inspection

The test specimen was inspected for conformance with applicable vendor drawings and Douglas SCD 1A49965. Part identification, including vendor name, vendor part number, specification control number, change letter and manufacturer's serial number, were recorded. Specimen weight was measured and recorded, and markings indicating "Test" and specimen number were verified. Results of this inspection were recorded on a test data sheet. Upon completion of the pre-test inspection, the two instrumentation ports shown on addendum page C-1, were capped. The caps remained on these ports throughout the test program.

4.2 <u>Proof Pressure Test</u> (See addendum page C-2.)

4.2.1 Actuator

With the test specimen on the test fixture, P/N 1T03446, both were installed in a burst chamber. The test apparatus was connected to the test specimen as shown schematically on addendum page C-2. The test specimen was stabilized at ambient room temperature and the pressure at the test specimen actuator port was gradually increased to 750 psig with gaseous helium at ambient room temperature. This pressure was maintained for 5 minutes. The test specimen and test medium pressure and temperatures were measured and recorded. System pressure was then decreased to zero psig and the helium vent valve opened. The test specimen was removed from the test apparatus to verify that there was no structural failure or permanent distortion.

4.2.2 Valve Body

With the test specimen mounted on test fixture P/N 1T03446, both were installed in a burst chamber. The test specimen was verified free of moisture by either clean room inspection or GN purge. After connecting the test apparatus to the test specimen as shown schematically on addendum page C-2, the nitrogen vent valve and the LN shutoff valve were opened and liquid nitrogen flowed through the test specimen until the temperature stabilized. The LN, shutoff valve was then closed and the drain valve opened. When liquid nitrogen ceased to flow, the drain and vent valves were closed. The GN, shutoff valve was then opened and the pressure increased at the test specimen inlet to 190 psig with GN₂ at a temperature of -300 $(\pm 20)^{\circ}$ F. This pressure was maintained for 5 minutes. The system pressure was then decreased to zero psig and the nitrogen vent valve opened. ing this test, the test specimen and test medium temperatures and pressures were measured and recorded. The test specimen was removed from the test apparatus to verify that there was no structural failure or permanent distortion.

4.3 Leakage Test

4.3.1 External Leakage

(See addendum page C-3.)

The test specimen was mounted on the test fixture, P/N 1T03446, and both were installed in a small sealed chamber. After connecting the test apparatus, using appropriate seals and fittings, to the test specimen inlet port as shown schematically on addendum page C-3, the test specimen was purged with helium gas and then the outlet port capped and sealed. To eliminate the helium background, the chamber was purged with air and then sealed. The chamber was evacuated with the roughing pump until the leak detector could take over and continue evacuating the chamber to the vacuum specified by the manufacturer for best operation. When the background level of helium was established the pressure to the test specimen inlet port was gradually increased to a maximum of 125 psig using gaseous helium at ambient room temperature. The leak detector meter indications were recorded at 25 psig increments. Test specimen and test medium temperatures and pressure were measured and recorded. Upon completion of the test, the leak detector shutoff valve was closed and the chamber pressure gradually increased to ambient room conditions by use of the vacuum release valve. The test apparatus was disconnected from the test specimen and removed from the chamber. Test specimen leakage rates were determined and recorded in such at each 25 psig increment. External leakage of the test specimen was not to exceed 1 scch.

4.3.2 <u>Internal Leakage</u> (See addendum page C-4.)

4.3.2.1 Gate Seal

After mounting the test specimen on the test fixture, P/N 1T03446, the test apparatus was connected, using appropriate seals and fittings, to the test specimen as shown schematically on addendum C-4. The leakage shutoff valve was closed and the

4.3.2.1 Gate Seal (Cont'd)

cooling and the LN shutoff valves opened. LN was flowed at 31 gpm through the test specimen until it was temperature stabilized. The pressure of the LN, was increased at the test specimen inlet port to 80 (+5) psig. When the test specimen was temperature stabilized, the helium gas pressure was increased at the test specimen actuator port to 475 psig using helium gas at ambient room temperature. This closed the test specimen. Liquid was maintained to the test specimen inlet at 80 (+5) psig. When liquid and/or gas ceased to flow at the cooling valve, the cooling valve was closed and the leakage shutoff valve opened. This inlet pressure was maintained for a period of 5 minutes while the internal leakage rate was determined. Determination of the leakage rate started with the first detected leakage. (i.e., bubbling in graduate). The test specimen and test medium temperature and pressure, the displaced water volume, time interval required to displace water, the gas temperature at the outlet of the heat exchanger, and the water temperature were measured and recorded. The leakage rate was determined in scim. Internal leakage rate was not to exceed 30 scim.

4.3 2.2 Actuator

After the test specimen was mounted on the test fixture, P/N 1T03446, installed in a small sealed chamber, the purged test apparatus was connected, using appropriate seals and fittings, to the test specimen actuator port as shown schematically on addendum page C-5. Test specimen inlet and outlet ports were not capped. The vacuum pump was started and the test apparatus and test specimen actuator evacuated. Vacuum pumping was stopped and the system pressure increased to zero psig using ambient room temperature helium gas. Using a mass spectrometer with a secondary roughing pump, the chamber was evacuated until the leak detector pumping system could take over the chamber are cuation. The leak detector evacuated the chamber to a vacuum specified by the equipment manufacturer for best operation. Then, the

4.3.2.2 Actuator (Cont'd)

helium background level was established and the pressure to the test specimen actuator port was increased to 475 psig using gaseous helium at ambient room temperature. The test specimen and test medium pressure and temperature and the leak detector meter indication were measured and recorded. Internal leakage rate of the test specimen actuator was determined in such and was not to exceed 1 such. The leak detector was isolated from the system and the chamber pressure increased to zero psig with the vacuum release valve. Pressure to the test specimen actuator port was reduced to zero psig and the vent valve opened. The test apparatus was then disconnected from the test specimen and the specimen was removed from the chamber.

4.4 Functional Test

(See addendum pages C-6 and C-7.)

4.4.1 Response Time

After mounting the test specimen on the test fixture, P/N 1T03446. the test apparatus was connected using appropriate seals and fittings, to the test specimen as shown schematically on addendum page C-6. Addendum page C-7 is a schematic diagram of the test specimen position indicator and test wire harness. The harness was connected to the test specimen and to a position indicator light panel. When the helium gas regulator was adjusted for a pressure of 475 psig at the test specimen actuator port, the 3-way solenoid valve was closed and the pressure at the actuator port decreased to zero psig. Liquid nitrogen was then flowed through the test specimen until it was temperature stabilized. The liquid flow was gradually increased to 31 gpm. A pressure of 80 psig was not exceeded at the test specimen inlet port. The 3-way solenoid valve was then opened and the test specimen allowed to shut off the flow of LN2. Pressure at the test specimen inlet, outlet, and actuator ports, the flow

4.4.1 Response Time (Cont'd)

through the test specimen, and the signals from the test specimen position indicator switch were recorded on a recording oscillograph. The test specimen and test medium temperatures were measured and recorded. The response time was determined from the instant of the first trace movement of the "Open" switch to the first trace movement of the "Close" switch. At the conclusion of the test, the LN₂ and helium gas flow were shut off and the specimen allowed to stabilize at ambient room temperature.

4.4.2 Position Indication

While performing the response time test of paragraph 4.4.1, the position indicator light panel was observed to verify the following conditions:

- a. The fully "Open" indication was present after temperature stabilization.
- b. The fully "Closed" indication was present when the outlet pressure had decreased to zero psig.
- c. The fully "Open" indication was present upon venting the actuator port to zero psig.
- d. The fully "Open" indication was present after the test specimen has stabilized at ambient room temperature.

4.4.3 Dielectric Strength

With the valve in the full open position, the specimen was stabilized at room ambient temperature. A 1000 vac rms, 60 cps, test voltage was applied for 1 minute between the pins listed below. The test voltage was raised from zero to 1000 volts at a rate not exceeding 250 volts per second for each point as tested. Current leakage was measured and recorded and was not to exceed 200 microamperes.

4.4.3 Dielectric Strength (Cont'd)

From Pin	To Pin
A-B common	C, D, F, G, J, K, M
C	D, F, G, J, K, M
D-E common	F, G, J, K, M
F	G, J, K, M
G-H common	J, K, M
J	K, M
K-L common	M
Ground	A-B common, C
	D-E common, F
	G-H common, J
	K-L common, M

With the valve in the closed position, the specimen was stabilized at room ambient temperature. A 1000 vac rms, 60 cps, test voltage was applied for 1 minute between the pins listed below. The test voltage was raised from zero to 1000 volts at a rate not exceeding 250 volts per second for each point as tested. Current leakage was measured and recorded and was not to exceed 200 microamperes.

To Pin

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K	B, D, E, G, H, K, L
B-C common	D, E, G, H, K, L
D	E, G, H, K, L
E-F common	G, H, K, L
G	H, K, L
H-J common	K, L
K	L-M common
Ground	A, B-C common, D, E-F common G, B-J common, K, L-M common

4.4.4 Insulation Resistance

From Pin

With the valve in the full open position, the specimen was stabilized at room ambient temperature. The resistance was measured and recorded between the pins listed below with 500 vdc power applied. The resistance was to be 100 megohms or greater.

4.4.4 Insulation Resistance (Cont'd)

From Fin	To Pin
1.	B, D, E, G, H, K, L
B-C common	D, E, G, H, K, L
D	E, G, H, K, L
E-F common	G, H, K, L
G	H, K, L
H-J common	K, L-
К	L-M common
Ground	I, B-C common, D, E-F common G, H-J common, K, L-M common

4.4.5 Bonding Resistance

With the valve in any position and stabilized at room ambient temperature, the resistance was measured between the ground pin and the valve body. The resistance was not to exceed 0.1 ohm.

4.4.6 Continuity Check (Open Position)

The test wire harness was disconnected from the specimen prior to performing the continuity check. With the valve in the fully open position, the specimen was stabilized at room ambient temperature. Continuity was verified between pins n-B, D-E, G-H, and K-L by measuring the resistance. The values were recorded. In no case was the resistance to exceed 0.25 ohm.

No continuity between pins B-C, E-F, H-J, and L-M was verified by measuring the resistance. The values were recorded. In no case was the resistance to be less than 20 megohms.

4.4.7 Continuity Check (Closed Position)

The wire harness was disconnected from the specimen prior to performing the continuity check. With the valve in the fully closed position, the specimen was stabilized at room ambient temperature. Continuity between pins B - C, E - F, J - H, and L - M was verified by measuring the resistance. The values were recorded. In no case was the resistance to exceed 0.25 ohm.

4.4.7 Continuity Check (Closed Position)(Cont'd)

No continuity between pins A - B, D - E, G - H, and K - L was verified by measuring the resistance. The values were recorded. In no case was the resistance to be less than 20 megohms.

4.5 Repeat Cycle Test

(See addendum page C-6.)

The repeat cycle test consisted of 500 cycles at low temperature, 450 cycles at ambient room temperature, and 50 cycles at high temperature. A low-temperature cycle consisted of closing the test specimen valve against a LW₂ flow of 31 gpm at an inlet pressure not exceeding 80 psig, then opening the test specimen valve. The ambient room temperature and high temperature cycles consisted of closing the test specimen valve against a gaseous nitrogen inlet pressure not exceeding 80 psig, then opening the test specimen valve. Cycling and data requirements were as indicated in paragraph 4.4.1. Allowable gate seal leakage after completion of all cycling tests was not to exceed 100 scim.

4.5.1 General

The test specimen was mounted on test fixture 1T03446 and placed in an environmental chamber capable of maintaining a temperature of +160°F. The test apparatus was connected to the test specimen as shown schematically on addendum page C-6. The operation of the 3-way solenoid valve to actuate and deactuate the test specimen valve by pressurizing or venting the test specimen actuation port pressure was controlled by the sequencer shown on addendum page C-6. The LN₂ shutoff valve was opened and LN₂ was maintained at the specimen throughout the repeat cycle test by venting the supply line.

4.5.2 Low Temperature Cycling

Using the procedure of paragraph 4.4.1, the specimen was temperature-stabilized with liquid nitrogen flow. Temperature stabilization was required only at the beginning of the cycling. The

4.5.2 Low Temperature Cycling (Cont'd)

sequencer was set to energize and deenergize the 3-way solenoid at a rate not exceeding 2 cycles/minute for a total of 500 cycles. Data specified in paragraph 4.4.1 was recorded every 25 cycles. At the completion of 500 cycles, the sequencer was stopped when the specimen valve was in the open position. Valve V1 and the LM2 shutoff valve were closed and valve V-2 opened. Using GM2, all of the LM2 was purged from the supply line. Valve V-2 was closed, valve V-1 opened, and all of the LM2 purged from within the test specimen. The flowmeter at the specimen outlet port was removed.

4.5.3 Ambient Room Temperature Cycles

Upon completion of 500 cycles at low temperature and with the specimen stabilized at ambient room temperature, valves V-1 and V-2 were closed and the pressure of the ambient room temperature GN₂ increased to 80 psig. Valve V-1 was opened and the sequencer started. The cycling sequence was as described in paragraph 4.5.2, except that ambient room temperature GN₂ was the test medium, until a total of 450 cycles were completed. The data specified in paragraph 4.4.1 was recorded every 25 cycles. Upon completion of the 450 cycles, the sequencer was stopped when the specimen valve was in the open position.

4.5.4 High Temperature Cycles

Upon completion of 450 cycles at ambient room temperature and with the test specimen stabilized at ambient room temperature, the ambient chamber temperature was increased to +160°F. The temperature was maintained for the duration of the test. The specimen was stabilized at +160°F, then valves V-1 and V-2 closed and the pressure of the +160°F gaseous nitrogen increased to 80 psig. Valve V-1 was opened and the sequencer started. The cycling sequence was as described in paragraph 4.5.2, except that gaseous nitrogen at +160°F was the test medium, until a total of 50 cycles were completed. The data specified in

4.5.4 High Temperature Cycles (Cont'd)

paragraph 4.4.1 was recorded every cycle. Upon completion of 50 cycles at +160°F, valve V-1 was closed and the chamber environment decreased to ambient room conditions allowing the test specimen to stabilize at ambient room temperature. The test apparatus was disconnected from the test specimen and the specimen removed from the environmental chamber.

4.5.5 Post Repeat Cycle Test

Upon completion of the 1000 cycles, the proof pressure, internal leakage, response time, position indication, insulation resistance, and continuity tests of paragraph 4.2, 4.3.2, 4.4.1, 4.4.2, 4.4.4, 4.4.6, and 4.4.7 respectively were performed.

4.6 <u>Vibration Test</u>

4.6.1 General

(See addendum pages C-8 through C-11.)

The test specimen was subjected to the vibration environment in each of three mutually perpendicular axes, using the vibration test setup as shown on addendum pages C-9 and C-10. The test apparatus was connected to the test specimen as shown schematically on addendum page C-8 and the specimen, including the associated mounting clamps, brackets, and supports, was attached to a rigid test fixture, which dynamically simulated the vehicle installation, per vibration test assembly drawing 1T07824.

Vibration test fixture P/N 1T01097 was used. The test specimen was instrumented with six accelerometers, located as shown on addendum page C-8. Vibration amplitude versus frequency and the G²/cps versus frequency were recorded on recorders from which reproducible copies of the plots could be obtained. Sinusoidal and random vibration tests were performed in one axis before changing the axis of vibration. The specimen axes were defined as follows:

4.6.1 General (Cont'd)

<u>Direction</u>	<u>Description</u>
A	Line of Flight - specimen rotated 16° counterclockwise in plane of inlet axis.
В	Radial Axis - 48° counterclockwise in plane of specimen outlet axis perpendicular to the flight axis.
С	Tangential Axis - normal to the radial axis.

4.6.2 Equalization Control System Checks

4.6.2.1 Sinusoidal Vibration

The control accelerometer (No. 1) signal between 5 and 200 cps on the up and downsweep was filtered utilizing a Spectral Dynamics tracking filter.

One alternate control accelerometer (No. 2) location was designated by the Acoustics and Structural Dynamics (A & SD) engineer. The signal from the alternate control(s) was filtered as above. In addition, the alternate control(s) was monitored during the filtered portion of the sweep and its acceleration level constrained to not exceed the test specification. This was accomplished using manual or automatic override techniques at the control console.

4.6.2.2 Random Vibration

The formal qualification vibration test of the specimen in each axis was conducted only after the data from the equalization control check for the same axis had been reviewed by the Acoustics and Structural Dynamics Section to verify that the proper spectrum had been obtained.

The signal from the control accelerometer was recorded on magmetic tape played back into a mean square acceleration spectral density analyzer (either analog or digital) with a filter having a bandwidth of 20 cps. Data were presented in graphical form showing, G^2/cps versus frequency. The random vibration level

4.6.2.2 Random Vibration(Cont'd)

to be used for equalization was 6 db below the specified test level (quarter-power level).

4.6.3 Operational Test

The operational test was performed while the test specimen was being subjected to the vibration tests. When the test apparatus was connected to the test specimen as shown schematically on addendum page C-8, the LN, shutoff valve was opened and LN, was flowed through the test specimen until the specimen was temperature stabilized. With the test specimen not actuated, the vent valve was closed and the LM, pressure increased to 80 psig. This pressure and temperature were maintained during the test. test specimen was actuated and deactuated at least once during each axis of applied vibration by applying gaseous helium at ambient room temperature and at a pressure of 475 psig to the test specimen actuator port. Deactuation occurred when the pressure at the actuator port was decreased to zero psig. The test specimen and test media pressures and temperatures and the number of cycles were measured and recorded. Upon completion of vibration in each axis, the LN, shutoff valve was closed and the the LN, vent valve opened.

4.6.4 <u>Sinusoidal Vibration Test</u>

(See addendum page C-9.)

The test specimen was assembled and installed on the test apparatus and instrumented as shown schematically on addendum page C-9. The operational test of paragraph 4.6.3 was performed while subjecting the test specimen to a sinusoidal logarithmic sweep at a rate of 1.0 octave per minute from 5 to 2000 to 5 cps in each axis at the amplitude shown below:

Frequency (cps)	<u>Amplitude</u>	
5 to 24	0.032-inch D.A.	
24 to 47	1.0 G peak	
47 to 200	0.0088-inch D.A.	
200 to 2000	17.5 G peak	

4.6.4 Sinusoidal Vibration Test (Cont'd)

All accelerometer outputs were recorded on a direct writing oscillograph. Testing continued directly to the random vibration test in paragraph 4.6.5.

4.6.5 Random Vibration Test

The operational test of paragraph 4.6.3 was performed while subjecting the test specimen to a random vibration environment having an approximate Gaussian amplitude distribution and a peakto-rms ratio of three. Equalization of the random input spectrum was accomplished by using a random vibration level which was not more than one-fourth of the actual test level. The equalized spectrum was monitored and readjusted during the test as necessary by:

- a. Using individual meters on each channel of the spectral density analyzer/equalizer or,
- b. Using graphical displays on spectral density analyzers.

The acceleration power spectral density applied to the test specimen was within ± 3 db when measured with a filter having a bandwidth of 20 cps.

A 12-minute random vibration was applied over the frequency interval as noted:

Frequency (cps)	<u>Amplitude</u>
20 to 60	0.01 G ² /cps
60 to 120	+10 db/octave
120 to 2000	0.1 G ² /cps

The power spectral density was recorded as a function of G^2/cps . Testing continued directly to the shock test in paragraph 4.7.

4.7 Mechanical Shock Test

(See addendum pages C-7 through C-10 and C-12.)

The test specimen was subjected to three shocks in one direction in each of three mutually perpendicular axes for a total of nine shocks. The test specimen including the associated mounting

4.7 Mechanical Shock Test (Cont'd)

clamps, brackets, supports, and test apparatus, was attached to a rigid test fixture, P/N 1T01097, which dynamically simulated the vehicle installation, and instrumented as shown schematically on addendum pages C-7. C-8, and C-10 with six accelerometers. All accelerometer signals were recorded on an oscillograph while the oscilloscope presentation of the shock input transients was recorded photographically. The shocks were performed on a L-249 vibration exciter. The test sequence was sinusoidal vibration, random vibration, and shock prior to changing axis.

4.7.1 Shock Test Levels and Axes

The shock level for all three axes was 20 G's peak amplitude of a half sine pulse for a duration of 10 (±2) milliseconds. Shocks were applied in either direction along the A, B, and C axes. The test specimen was to withstand the nine shocks without failure. Integrity of the test specimen was verified by performing an inspection after completion of the shock test. The sinusoidal, random, and shock tests were repeated for the remaining axes.

4.7.2 Post Vibration and Shock Test

The proof pressure and leakage tests of paragraphs 4.2 and 4.3 were performed after completion of all shock and vibration tests.

5.0 TEST RESULTS AND DISCUSSION

5.1 Pre-test Inspection

Pre-test inspection was performed October 12, 1966. The test specimen was free of apparent defects, was properly identified and, therefore, considered acceptable for testing. Results of this inspection are presented on addendum page A-1.

5.2 Proof Pressure Test

Actuator and valve body proof pressure tests were performed three times (pre-functional, post repeat cycle, and post vibration) during the test program as required. There was no evidence of structural failure or permanent distortion as a result of these pressurizations. Results of these tests are presented on addendum pages A-2, A-39, and A-84.

5.3 Leakage Test

External and internal leakage tests were performed as required. External leakage was negligible. Internal leakage was well below the maximum allowable rate of 1 such except during the post vibration leakage check where a leakage rate of 32,570 such was recorded. Results of these tests are presented on addendum pages A-3, A-4, A-40, and A-85 through A-87.

5.4 Functional Test

Functional tests were performed (omitting dielectric strength) to check valve response time and electrical characteristics. Results of these tests are presented on addendum pages A-5 through A-7 and A-41 through A-43. Valve actuation closing time varied from 0.050 second to 0.054 second (no limit was specified). Valve actuation opening time was 0.210 second (no limit was specified).

While performing valve response tests, the valve position indicator lights were checked for proper indication of valve position. In every case the lights indicated that the valve had assumed the

5.4 Functional Test (Cont'd)

proper position dependent upon the test conditions imposed.

Complete or partial electrical tests were performed during the test program. The results of these tests are presented on addendum pages A-6, A-7, and A-42 and A-43. The dielectric strength test was performed only once in order to avoid possible damage to the electrical insulation. The electrical characteristics (dielectric strength, insulation resistance, bonding, resistance, and continuity) are all within the limits specified.

5.5 Repeat Cycle Test

Ambient, high, and low temperature repeat cycle tests were performed. These cycles were followed by proof pressure, internal leakage, response time, position indication, insulation resistance, and continuity tests. The results of this testing are presented on addendum pages A-8 through A-38.

Valve response time varied as follows:

Ambient temperature - Closing time 0.015 to 0.019 second Opening time 0.192 to 0.220 second

High temperature - Closing time 0.015 to 0.017 second Opening time 0.098 to 0.108 second

Low temperature - Closing time 0.010 to 0.057 second Opening time 0.106 to 0.297 second

All post repeat cycle tests were within the specification limits. These data are presented on addendum pages A-39 through A-43.

5.6 Vibration and Mechanical Shock Tests

Sinusoidal vibration, random vibration, and mechanical shock tests were performed on the test specimen in the following sequence: thrust (A), radial (B), and tangential (C). The testing was completed in each axis prior to changing the setup for the next axis.

5.6 Vibration and Mechanical Shock Tests (Cont'd)

All vibration test setups and acceleration levels were approved by the Acoustics and Structural Dynamics Representative.

Thrust axis sinusoidal vibration control accelerometers (upscale, downscale, filtered, and unfiltered) data are presented on addendum pages A-44 and A-46 through A-51. All control accelerometer data are within or above specification. Thrust axis random vibration levels are within or above the 3 db specification level as shown on addendum pages A-45 and A-52 through A-56.

Thrust axis shock pulse data are presented on addendum pages A-45 and A-57. These shock pulses were obtained utilizing an L-249 vibration exciter (typical for all shock test's) and are within the $20\pm3-0$ level and 10 ± 2 milliseconds time duration of the specification.

Radial axis sinusoidal vibration control accelerometers data are presented on addendum pages A-58 and A-60 through A-65. Testing was stopped at 1000 cps on the upsweep to change the control and alternate accelerometers (number 1 and 2). These accelerometers were changed due to poor response at low temperatures. Examination of the upsweep test data indicated the test levels were 70 to 100% over specification levels from 100 to 1000 cps. Since internal leakage tests were required only at the conclusion of all vibration and shock testing no specimen damage due to overtest was indicated at this time. Therefore, after changing the control and alternate accelerometers testing continued to the conclusion of all vibration and mechanical clock. Radial axis random vibration data are presented on addending pages A-59 and A-66 through A-68 and are within or above the 3 dr specification level.

Radial axis shock pulse data are presented on addendum pages A-59 and A-69.

5.6 Vibration and Mechanical Shock Tests (Cont'd)

Tangential axis sinusoidal vibration accelerometer data are presented on addendum pages A-70 and A-72 through A-77. All control accelerometer levels are within or above the specified limits over the entire frequency range.

Tangential axis random vibration data are presented on addendum pages A-71, A-78 through A-81, and A-83 and are within or above the 3 db specification level.

Tangential axis shock pulse traces are presented on Addendum page A-82. There was no apparent damage to the specimen.

Vibration data for the response accelerometers are not included in this report; however, unreduced data have been filed and are available upon request.

Post vibration and shock proof-pressure and external leakage tests were satisfactorily accomplished. Results are presented on Addendum A-84 and A-85.

6.0 CONCLUSION

Because the post vibration and shock internal leakage was 32,570 such (as indicated in Addendum A-86 and A-87), with the specification maximum being 1 such, testing was discontinued and the specimen returned to the Douglas Santa Monica Facility for failure analysis. The failure was attributed to the over testing during the radial axis sinusoidal vibration from 100 to 1000 cps of the upsweep (see D-1 through D-16).

7.0 REFERENCES

1A49965, Revision Y, Douglas Epecification Control Drawing 1T07782, Revision C, Douglas Test Requirements Drawing 1T07783, Revision D, Douglas Test Procedure 1T03446, Douglas Test Fixture SM-41412, Douglas Saturn General Test Plan SM-46532, Douglas Formal Qualification Test Program

ATTACHMENTS:

Pages A-1 through A-78 Pages B-1 through B-2 Pages C-1 through C-12 Pages D-1 through D-16 Pages E-1 through E-5

ADDENDUM A
TEST DATA SHEETS .

Item Name: LO Chilldown System Shutoff Valve
Part Number: 1A49965-521
Test Procedure Drawing No: 1707783 Change Letter: C
Manufacturer's S/N: OZO/ Test Plan Line Item: FQ-F-14A
Test Laboratory: BEECH AIRCRAFT Location: BOULDER, COLORADO
Douglas Test Representative: K.C. TOLIDES Date: 10-12-66
Test Witness:
Douglas Q.C. Customer Q.C.
Pre-Test Inspection Per Paragraph: 5,8
Test Specimen No:
Test Start (Date, Time): 10-12-66, 1500
Test Completed (Date, Time): 10-12-66, 1530
Vendor Name: FAIRCHILP-HILLER. Vendor P/N: 64-401-05
Vendor Drawing No: 64-401-05
Conforms to Vendor Drawing: 64-401
Specification Control No: 1449965-521 Change Letter:
Conforms to Specification Control Drawing:
Test Specimen Weight: 2908 GRAMS = 616s., 6.6 oz.
Accept: X Reject:
Comments:

Item Name: LO2 Chilldown Sy	stem Shutoff Valve		
Part Number: 1A49965-521			
Test Procedure Drawing No:	1707783	Change Letter:	C
Manufacturer's S/N: 020	Ol Test Pla	n Line Item: FQ-F	-14A
Test Laboratory: Reech A	IRCCAFT Location	: Bouloek,	COLORADO
Douglas Test Representative:	K.C. TOLIDE	Date:	10-15-66
Test Witness:	. 11	F:	
Dougla Proof Fressure Test Per Parag	. 22		Q.C.
Test Specimen No:			and a state of the
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Test Completed (Date, Time):			
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Test Parameter	Unita	Required	Actual
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Pressure	š - š	190	190
'Time	minutes	5	.5
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A ctua tor Test Parameter	Units	Required `	Actual
Tempera ture	$\circ_{_{ m F}}$	Ambient	67
Pressure	psig	7 50	750
Time	minutes	55	5
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Part Number: 1A49965-521	and the state of t		
Test Procedure Drawing No: 1TO	7783	Change Letter:	
Manufacturer's S/N: 0201	Test Pl	an Line Item: FQ-	-F-14A
Test Laboratory: BEECH AIRC	RAFT Location	DO BOYLDER	CoLO
Douglas Test Representative: K	C. TOLIDES	Date: 12	7-18-66
Test Witness: 1. Douglas Q. C	\tag{\text{\text{\$\chi}\$}\tag{\text{\$\chi}\$}\tag{\text{\$\chi}}\tag{\text{\$\chi}}\tag{\text{\$\chi}}\tag{\text{\$\chi}}	Customer Q.	······································
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Test Completed (Date, Time): 10-	18-66,1436	was.	
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External Leakage			
Test Parameter .	Units	Required	Actual
Specimen Temperature	°F	Stabilized	39
Leakage Rate	scch	1.0	4 × 10-9
Inlet Pressure	psig	125 Maximum	125
Time Maintained	Minutes	5	5
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Test Procedure Drawing No:	1707783	Change Let	ter:C
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Test Laboratory: BEECH AL	RERAFT Locat	tion: BOULDE	e, Colo.
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Test Parameter	Units	Required	Actual
Specimen Temperature	°F	Stabilized	-300
Inlet Pressure	psig	80 Maximum	78
Actuator Port Pressure	psig	475	475
Leakage Rate	scim	30	1.9
Time Maintained	minutes	5	5
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Test Parameter	Units	Required	Actual
Actuator Port Pressure	psig	475	475
Specimen Temperature	°F	Ambient	56
Leakage Rate	scch	1.0	3.5 X 103
Maintained	minutes	5.	5

Item Name: LO, Chilldown	System Shuton	f Valve	
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Test Procedure Drawing No: 1707	783	Change Lette	r: <u>c</u>
Manufacturer's S/N: 0201	Test	t Plan Line Item: FQ-	F-14A
Test Jaboratory: BEECH A	RCLAFT Loca	ation: Bouloek,	COLORADO
louglas Test Representative:	K.C. TOLI	Date	e: <u>10-19-66</u>
Test Witness:	Q.C.	Custom	er Q.C.
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Test Specimen Mo:			
Test Start (Nate, Time): //-	19-66. 17	128	
Test Completed (Date, Time):	•		
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Test Parameter	Units	Required	Actual
Specimen Temperature	o _F	Stabilized	-293
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Pressure (Inlet)	psig	80 max.	60
Flow	gran	31 max.	NA
Pressure (Actuator)	ps ig	475	475
Response Time	sec.	Closing	0.054
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C. Actuator Pressure Zero_	5 8131	OPEN Indicator Light	ON
D. Temperature at Ambient_		OPEN Indicator Light	ON
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Test Parameter	Units	Required	Actual
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Item Name: 102 Chilldow	n Syctem Shut	off Valve		
Part Number: 1A49965-521				
Test Procedure Drawing No:	1707783		_ Change Lette	r: <u>C</u>
Manufacturer's S/N: <u>02</u>	01	Test Plan	Line Item: FQ	-F-14A
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Inlet Trescure	1818		80 maximum	66
Flow (G)	gpm		31 maximum	NA
Actuator were use	psig		475	470
Response Time	sec.		losing	0.056
bapes: good 2	in./sec.	É	Opening	0.188
Flow Coale N/A				
Presence Wase 20	1			
Time Dans 500 cycles,	/ seconds			

Repeat Cycle Test Fer Paragi	apa: 2.17	Test Plan Line It	em: Fu-r-14A
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Specimen Temperature	o _F	stabilized	-230
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Inlet freasure	psig	80 maximum	39
Flow (IM)	gpm	31 maximum	N/A
Actuator Pressure	psig	475	475
Response Time	sec.	Closing	0.044
Paper Speed 25	in/sec.	Flow Scale N	/A 0.210 gpm/inc
Pressure Scale 20	psig/inch	Time Base 500 Ca	
75 Cycles			w
Test Farameter	Units	Required	Actual
Specimen Tagerature	Op	stabilized	-230
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Flow (INa)	gpm	31 maximum	NA
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Test Parameter Units Required Actual Specimen Temperature of Stabilized -240 Inlet Pressure psig 80 maximum 38 Flow (1M ₂) gpm 31 maximum N/A Actuator Pressure psig 475 470 Response Time sec. Closing 0.054 Pressure finate Required Actual Specimen Temperature of Stabilized -240 Inlet Pressure psig 80 maximum 32 Inlet Pressure psig 80 maximum N/A Actuator response finate sec. Closing 0.044 Response Time sec. Closing 0.044 Response Time sec. Closing 0.044 Inlet Pressure psig in/A grm/inch Specimen Temperature psig 475 Response Time sec. Closing 0.044 Specimen Temperature of Stabilized Actual Specimen Temperature psig in/sec. Flow Scale Scale 240 Inlet Pressure psig 31 maximum N/A Actual Specimen Temperature psig 31 maximum N/A Actual Specimen Temperature psig 31 maximum N/A Actual Specimen Temperature psig 31 maximum N/A Actual Pressure psig 475 Response Time sec. Closing 0.044 Actual Specimen Temperature psig 475 Response Time sec. Closing 0.044 Actual Specimen Temperature psig 475 Response Time sec. Closing 0.044 Actual Specimen Temperature psig 475 Response Time sec. Closing 0.044 Actual Specimen Temperature psig 475 Response Time sec. Closing 0.044 Actual Specimen Temperature psig 475 Response Time sec. Closing 0.044 Actual Specimen Temperature psig 475 Actual Specimen Temperatu	Repeat Cycle Test Fer Ferego	rupà: <u>5.1</u>	?Test Plan LimeItem:	FQ-F-14A
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Flow (18g) gram 31 maximum N/A Actuation Pressure psig 475 470 Response These sec. Closing 0.054 Faper opens 25 in/sec. Flow Scale y/A gram/incl Pressure (rate 20 psig/inch Time Base 500 cycles seconds 150 Cycles Test formater Units Required Actual Specimen Temperature by stabilized 240 Inlet Pressure psig 80 maximum 32. Flow (18g) gram 31 maximum N/A Actuator ressure psig 475 470 Response that sec. Closing 0.047 Cycles Flow Scale y/A gram/incl Fresche Scale 20 psig/inch Time Base 500 cycles / seconds 175 Cycles Test formater Units Required Actual Specimen Temperature bits Required Actual Specimen Temperature psig 80 maximum 30 Inlet freesure psig 475 Response Time 80. Closing 0.0444 Response Time 80. Closing 0.0444 Response Time 80. Closing 0.0238 Response Time 80.0238 In/sec. Flow Scale gram/incl Response Time 80.0238 Response Time 80	Specimen Temperature	o _F	Stabilized	-240
Flow (18g) gram 31 maximum N/A Actuation Pressure psig 475 470 Response These sec. Closing 0.054 Faper opens 25 in/sec. Flow Scale y/A gram/incl Pressure (rate 20 psig/inch Time Base 500 cycles seconds 150 Cycles Test formater Units Required Actual Specimen Temperature by stabilized 240 Inlet Pressure psig 80 maximum 32. Flow (18g) gram 31 maximum N/A Actuator ressure psig 475 470 Response that sec. Closing 0.047 Cycles Flow Scale y/A gram/incl Fresche Scale 20 psig/inch Time Base 500 cycles / seconds 175 Cycles Test formater Units Required Actual Specimen Temperature bits Required Actual Specimen Temperature psig 80 maximum 30 Inlet freesure psig 475 Response Time 80. Closing 0.0444 Response Time 80. Closing 0.0444 Response Time 80. Closing 0.0238 Response Time 80.0238 In/sec. Flow Scale gram/incl Response Time 80.0238 Response Time 80		***************************************		
Actuator Pressure psig 475 470 Response Time sec. Closing 0.054 Paper cyclid 25 in/sec. Flow Scale gm/incl Pressure feate 20 psig/inch Time Base 500 cycles seconds 150 Cycles Test Farameter Units Required Actual Specimen Temperature of stabilized 240 Inlet Pressure psig 80 maximum 32 Flow (120) gra 31 maximum N/A Actuator resistan psig 475 470 Response Test of the 20 psig/inch Time Base 500 cycles seconds 175 Cycles Test Farameter Units Required Actual Specimen Temperature psig 475 470 Inlet Pressure Test producter Units Required Actual Specimen Temperature of stabilized 240 Inlet Pressure Psig 80 maximum 30 Inlet Pressure psig 475 475 Responsy Time sec. Closing 0.044 Inlet Pressure psig 475 475 Responsy Time sec. Flow Scale 90.044 Inlet Pressure psig 475 475 Responsy Time sec. Closing 0.044 Inlet Pressure psig 475 475 Responsy Time sec. Flow Scale 90.044 Inlet Pressure Paper Scale 90.044	Inlet Pressure	psig	80 maximum	3 8
Responde Time Responde Time Responde Time Responde Time Required In/sec. Flow Scale Required Actual Specimen Temperature Price (1%) Reput (1	Flow (IN2)	gpa	31 maximum	N/A
Paper speed 25 in/sec. Flow Scale W/A ggm/incl Pressure fieste 20 psig/inch Time Base 500 cycles / seconds 150 Gyaleo Test Farameter Units Required Actual Specimea Temperature of stabilized -240 Inlet Pressure psig 80 maximum 32 Flow (1Mg) ggm 31 maximum M/A Actuator reasure psig 470 Response Time sec. Closing 0.044 Freshole Temperature of in/sec. Flow Scale 0.044 Freshole Temperature of seconds 175 Cycles Test Parameter Units Required Actual Specimen Temperature of stabilized -240 Inlet Pressure psig 475 Test Parameter Units Required Actual Specimen Temperature of stabilized -240 Inlet Pressure psig 80 maximum 30 Inlet Pressure psig 90 maximum 90 maxim	Actuator Pressure	psig	475	470
Paper speed 20 psig/inch Time Base 500 cycles / seconds 150 Cycles Test Farameter Units Required Actual Specimen Temperature of stabilized -240 Inlet Pressure psig 80 maximum 32 Flow (12) Actuator reasure psig 475 470 Response Time 35 in/sec. Flow Scale 500 cycles / seconds 175 Cycles Test Parameter Units Required Actual Specimen Temperature psig 475 470 Inlet pressure psig 475 470 Inlet pressure finale 20 psig/inch Time Base 500 cycles / seconds 175 Cycles Test Parameter Units Required Actual Specimen Temperature of stabilized -240 Inlet pressure psig 80 maximum 30 Response Time sec. Clesing 0.044 Response Time sec. Clesing 0.044 Response Time sec. Flow Scale 90.044 Paper Speed 25 in/sec. Flow Scale 90.044	Response Time			<u> </u>
Pressure feete 20 psig/inch Time Base 500 cycles / seconds 156 Gyales Test Farameter Units Required Actual Specimen Temperature CF stabilized -240 Inlet Pressure psig 80 maximum 32 Flow (1Mg) grm 31 maximum M/A Actuates Transure psig 475 Response Time Sec. Closing 0.042 Fresch of Scale 20 psig/inch Time Base 500 cycles / seconds 175 Cycles Test Parameter (Inits Required Actual Specimen Temperature psig 60 maximum 30 Inlet ressure psig 60 maximum 30 Actuator Pressure psig 475 Response Time sec. Closing 0.044 Paper Speed 25 in/sec. Flow Scale M/A Cycles Response Time sec. Flow Scale M/A Cycles Flow Scale M/A Cycles Response Time Sec. Flow Scale M/A Cycles gpm/inch Paper Speed 25 in/sec. Flow Scale M/A Cycles gpm/inch	Paper speed 25	in/sec.	Flow Scale	0.232 A gpm/incl
Test Farameter Units Required Actual Specimen Temperature OF stabilized — 240 Inlet Pressure psig 80 maximum 32 Flow (LN _c) gpm 31 maximum M/A Actuator reassure psig 475 Fager Joint 10/sec. Flow Scale — N/A gpm/incl Fressure Test Parameter Units Required Actual Specimen Temperature OF stabilized — 240 Inlet tressure psig 60 maximum 30 Inlet tressure psig 60 maximum 30 Inlet tressure psig 60 maximum 30 Inlet tressure psig 475 Response Time sec. Closing 0.044 Fresh Parameter Units Required Actual Specimen Temperature Psig 60 maximum 30 Inlet tressure psig 475 Response Time sec. Closing 0.044 Paper Speed 25 in/sec. Flow Scale N/A 0.238 Fresh Paper Speed 25 in/sec. Flow Scale N/A 0.238 Fresh Paper Speed 25 in/sec. Flow Scale N/A 0.238 Fresh Paper Speed 25 in/sec. Flow Scale N/A 0.238 Fresh Paper Speed 25 in/sec. Flow Scale N/A 0.238 Fresh Paper Speed 25 in/sec. Flow Scale N/A 0.238 Fresh Paper Speed 25 in/sec. Flow Scale N/A 0.238	Pressure frate 20		•	is the second se
Test Farameter Units Required Actual Specimen Temperature CF stabilized -240 Inlet Pressure psig 80 maximum 32 Flow (1%) grm 31 maximum M/A Actuator pressure psig 475 Farameter Specimen Flow Sec. Closing 0.234 Farameter Specimen Time Base 500 cycles / seconds If Cycles Test harmaeter Units Required Actual Specimen Temperature Psig 60 maximum 30 Inlet treasure psig 475 Find (1%) grm 31 maximum M/A Actuator Pressure psig 475 Response Time sec. Closing 0.234 Find (1%) grm 31 maximum M/A Actuator Pressure psig 475 Response Time sec. Closing 0.044 Find (1%) grm 31 maximum M/A Response Time sec. Closing 0.044 Find (1%) grm 31 maximum M/A Response Time sec. Closing 0.044 Find (1%) grm 1.565 Find (1%				
Specimen Temperature Cr	150 Cycles			
Inlet Pressure psig 80 maximum 32. Flow (1%) grm 31 maximum M/A Actuator Pressure psig 475 476 Reupuble Time sec. Closing 0.044 Freshule Teach 20 psig/inch Time Base 500 cucles / seconds 175 Cycles Test Paremeter Units Required Actual Specimen Temperature °F stabilized -240 Inlet Pressure psig 475 475 Actuator Pressure psig 475 475 Response Time sec. Closing 0.044 Paper Speed 25 in/sec. Flow Scale 0.044 Paper Speed 25 in/sec. Flow Scale 0.044	Test Farameter	Units	Required	Actual
### ### ##############################	Specimen Temperature	O _{ji} ,	stabilized	-240
### ### ##############################				
Actuator ressure psig 475 Response Time sec. Response Time sec. Response Time psig 475 Affordation sec. Closing O.22 Paper Ipsed 25 in/sec. Flow Scale Affordation of the psig/inch seconds Time Base SOO cycles seconds Required Actual Specimen Temperature of stabilized Actual Flow (LB) Spm 31 maximum N/A Actuator Pressure psig 475 Response Time sec. Paper Speed 25 in/sec. Flow Scale of N/A gpm/inch	Inlet Pressure	psig	80 maximum	32
Actuator ressure psig 475 Response Time sec. Response Time sec. Response Time psig 475 Affordation sec. Closing O.22 Paper Ipsed 25 in/sec. Flow Scale Affordation of the psig/inch seconds Time Base SOO cycles seconds Required Actual Specimen Temperature of stabilized Actual Flow (LB) Spm 31 maximum N/A Actuator Pressure psig 475 Response Time sec. Paper Speed 25 in/sec. Flow Scale of N/A gpm/inch	Flow (12%)		31 maximum	N/A
Faser Local 25 in/sec. Flow Scale 20 gpm/incl Freshold Scale 20 psig/inch Time Base 500 cycles seconds 175 Cycles Test Fareacter Units Required Actual Specimen Temperature °F stabilized -240 Inlet iressure psig 80 maximum N/A Flow (LB) gpm 31 maximum N/A Actuator Pressure psig 475 475 Response Time sec. Closing 0.044 Paper Speed 25 in/sec. Flow Scale		psig	475	470
Pressure Scale 20 psig/inch Time Base 500 cycles / seconds 175 Cycles Test fareacter Units Required Actual Specimen Temperature Properature Paper Speed 25 in/sec. Flow Scale 500 cycles / seconds Required Actual Actual Actual Paper Speed 25 in/sec. Flow Scale 500 cycles / seconds Required Actual Actual Actual Paper Speed 25 in/sec. Flow Scale 500 cycles / seconds	Recounte Time	sec.		
Pressure Scale 20 psig/inch Time Base 500 cycles / seconds 175 Cycles Test fareacter Units Required Actual Specimen Temperature Properature Paper Speed 25 in/sec. Flow Scale 500 cycles / seconds Required Actual Actual Actual Paper Speed 25 in/sec. Flow Scale 500 cycles / seconds Required Actual Actual Actual Paper Speed 25 in/sec. Flow Scale 500 cycles / seconds	Paper Spard 25	in/sec.	Flow Scale - N	0.234 A gpm/incl
Test formacter Units Required Actual Specimen Temperature PF stabilized Z/O Inlet ressure psig 80 maximum Phow (LEs) 5pm 31 maximum N/A Actuator Pressure psig 475 475 Response Time sec. Clasing 0.238 Paper Speed 25 in/sec. Flow Scale N/A gpm/inch				
Test foremeter Units Required Actual Specimen Temperature of stabilized -240 Inlet pressure psig 80 maximum 30 Flow (LN ₂) 8pm 31 maximum N/A Actuator Pressure psig 475 Response Time sec. Classes 0.044 Paper Speed 25 in/sec. Flow Scale gpm/inch	175 Cunta.			
Specimen Temperature of stabilized — Z40 Inlet resource psig 80 maximum 30 Flow (LE) 5pm 31 maximum N/A Actuator Pressure psig 475 475 Response Time sec. Clasing 0.238 Paper Speed 25 in/sec. Flow Scale 0.238 gpm/inch		Units	Required	Actual
Inlet ressure psig 80 maximum 30 Flow (LE) 5pm 31 maximum N/A Actuator Pressure psig 475 475 Response Time sec. Classes 0.044 Paper Speed 25 in/sec. Flow Scale 0.238 gpm/inch	augicumatics (III), dis administration (III), appropriate propriate des financiales des interessentes des dependencies de despetation (III).			
Flow (LEG) 5pm 31 maximum N/A Actuator Pressure psig 475 475 Response Time sec. Classical 0.044 Paper Speed 25 in/sec. Flow Scale N/A gpm/inch	Differential Temporal and the second		SCHULLIZEG	* Z.*10
Flow (LEG) 5pm 31 maximum N/A Actuator Pressure psig 475 475 Response Time sec. Classical 0.044 Paper Speed 25 in/sec. Flow Scale N/A gpm/inch	Management of the property of the contract of			729 400
Actuator Pressure psig 475 475 Response Time sec. Clasing 0.044 Paper Speed 25 in/sec. Flow Scale N/A gpm/inch	Contraction of the contraction o	psig '		130
Response Time sec. Clasing 0.044 Paper Speed 25 in/sec. Flow Scale W/A 97238 gpm/incl	and the second of the second s			N/A
Paper Speed 25 in/sec. Flow Scale W/A 0,238 gpm/inch	Actuator Pressure	psig	475	475
to the second se	Response Time	sec.	Clasins	
to the second se	Paper Speed 25	in/sec.	Flow Scale N	/A 0,238 gpm/incl
	Pressure Shale 20	psig/inch	to the control of the	c/es/ seconds

Repeat Cycle Test Far Faragi	rap : 5.19	Test Plan Line Item:	FQ-F-14/
200 Cycles			
Test Parameter	Units	Required	Actual
Specimer Temperature	O.B.	stabilized	-246
Inlet iressure	psig	80 maximum	42
Flow (LH ₂)	gpm	31 maximum	N/A
Actuator Pressure	psig	475	475
Response Time	sec.	clasing	0.052
Paper Speed 25	in/sec.	Flow Scale N/	0.208 gpm/inch
Pressure Scale 20	psig/inch	Time Base 500 cy	cles / seconds
OGC Comita		•	
225 Cycles Test Parameter	Units	Required	Actual
Specimen Tuperature	$\circ_{_{ m F}}$	stabilized	-245
and the second s	a a man a a' a magainn an airm ann ann an ar a' an an ann an ann an an an an an an an a		
Inlet Free We:	psig	80 maximum	32
(Dp.)	gom	31 maximum	N/A
Litratus Precude	psig	475	475
Resonate "Law	sec.	Clasing	0.048
lager speed 25	in/sec.	Flow Scale A	//A 0, 297 gpm/inch
Pression (state Zo	psig/inch	Time Base 500 Cyc	į.
DEL CHARLES			*
250 Cycles Test Ferameter	Units	Required	Actual
Specimen Temperature	OF	stabilized	-244
and the second s	*		
Inlet Pressure	psig	80 maximum	22
Flow (LM2)	gpm	31 maximum	N/A
Actuator Pressure	psig	475	475
Response Time	sec.	clasing	0.048
Paper Speed 25	in/sec.	Flow Scale	A 0.194
Pressure Scale 20	psig/inch		Cles seconds

Repeat Cycle Test Per Paras	grarh: 3./4	Test Plan Line Item:	ry-r-14A
275 Cycles Test Parameter	Units	Required	Actual
Specimen Temperature	o _F	stabilized	-246
august fingere anteres commente and announce of the commente anterior and anterior and an extra announce of the	~		
Inlet Pressure	psig	80 maximum	33
Flow (LAZ)	gpm	31 maximum	N/A
Actuator Pressure	psig	475	4.65
Response Time	sec.	Clasing	0.044
Paper Speed 25	in/sec.	Flow Scale	0.236 gpm/inc
Pressure Scale 20	psig/inch	Time Base 500 ou	cles / second
			7
300 Cycles Test Parameter	Units	Required	Actual
Specimen Temperature	° g	stabilized	-246
man de la companya d	Contract to the second of the contract of the		
into the stare	l psis	80 maximum	26
le (Ug)	EPA.	31 maximum	N/A
) p.1g	475	470
As a second of the second of t	sec.	Closing	0.037
25	in/sec.	Flow scale N	/A gpm/inc
2.0	p/lg/inch	Time Base 500 cy	
	· · · · · · · · · · · · · · · · · · ·	de to om ordelf describer til e kontinentrett at der tordenskant kontinentretten i kontinen om bekenne med describer	7
£ 27 - 1883.	i delte	Required	Actual
Gerran Proposition	O ₂₀	stabilized	-245
to the second of	a a a a grego constança e em communicado e en es e entretê e a de	more account of the second contract of the se	
Ambro Consumo Mizar (IM)	DSIX	80 maximum	2.8 *//*
and the second of the second o	STOL TOTAL	31 maximum 475	17/2
- Constant Instrume	poig	-	<u> </u>
	Sec.	Closing	0,050 , 0,750
iagos Opera 25	in/sec.	krow posite	A gpm/inc
Pressure Scale 20	msig/inch	Time Base 500 cy	cles / second

Repeat Cycle Test Per Paragraph	5.19	Test Plan Line Item:	FQ-F-14A
350 Cycles			
Test Parameter	Units	Required	Actual
Specimen Temperature	$\circ_{\mathbf{F}}$	stabilized	-247
Inlet Pressure	psig	80 maximum	27
Flow (LM2)	gpm	31 maximum	NA
Actuator Pressure	psig	475	420
Response Time	sec.	Closing Opening Flow scale	0.050
Paper Speed 2	in/sec.	Flow Scale N	A gpm/inch
Pressure Coale 20	psig/inch	Time Base 500 c	ucles /seconds
375 Cycles Test Parameter	Units	Required	Actual
and the second s	0 _F .		
Specimen Temperature	r	stabilized	-247
The state of the s		20.	41 80
Inlet Pressure	Psi ₅	80 maximum	NOT RECORDED
Flow (Chg)	gim	31 maximum	N/A
and Demokration — Demokration	1,	475	NOT RECERDED
Se dia wax di Lise	C.	me all	NOT RELURATED
LOUGE HUNG UP	13/100	Flow Co. le N/	gpm/inch
NOT RELOADE	SP / M. / inch	Time da a Mor Ro	ECORDEO Decondi
	hit.	S quirel	Actual
	0,	stabilized	-247
1 1/34.5 St.		9030111200	- 47
	The second secon	80 maximum	32
Flow (1882)	p/ <u>16</u>	31 maximum	NA
Actuator Protects	rie	375	420
Penna din		Closing	0.010
Region (1993)	10 mail (10	Opening	/A 0. 106 grm/inch
Pressure 4 20	ir, in:h	11m 2 500	, ,
			7

Repeat Cycle Pest Fer Faragraph		Test Plan Line Item_1	- G-L-TAV
425 Cycles			
Test Parameter	Units	Required	Actual
Specimen Temperature	o ^k	stabilized	-247
Inlet Pressure	ps ig	. 80 maximum	80
Flow (LM ₂)	gom	31 maximum	N/A
Actuator Pressure	psig	475	425
Response Time	sec.	closing	0.057
Paper Speed 25	in/sec.	Opening Flow Scale N	A gpm/inch
Pressure beals 20	psig/inch.	Time Base 500	
N			7
450 Cycles Test Farameter	I Im & A -	Danie - 3	A a de 7
nest rarameter	Units	Required	Actual
Specimen Pemperature	ာ _F	stabilized	-232
Commence of the Commence of th	anaghtus e fauir hannadha a' taoidhni. O'r da fauirthiau thaoi dhaoidh air tu mala		
Inlet breasure	psig	80 maximum	37
Flow (1892)	<u> 50m</u>	31 maximum	N/A
ic na r , see more	psig	475	460
Real Mr. Time	see.	Closing	0.050
Paper Spania 25	in/sec.	Flow Scale N/	0.250 gpm/inch
President Zo	psig/inch	Time Base 600 c	
		**	3 /
475 Cyr : es	pinali n.i. 1969bilikan geneguwa sasangga satti pike e Palgengengaya.		
Test Extancter	Units	Required	Actual
Specimen Conserutare	o ^k .	stabilized	-732
Committee Commit	. Name of the Control		
Inlet Eresone	peig	80 maximum	37
Flow (LE2)	gpm	31 maximum	N/A
Actuator Pressure	psig	475	465
Response Time	sec.	Clasing	0.049
Paper Speed 25	in/sec.	Opening Flow Scale A	0.044 0.250 A gpm/inch
Pressure Scale ZO	psig/inch	Time Base 500 C	

Test Parameter	Units	Required	Actual
Specimen Temperature	o _F	stabilized	-232
nlet Pressure	psig	80 maximum	31
low (L#g)	ROm	31 maximum	N/A
ctustor Pressure	psig	475	465
iesponse Mme	sec.	Closing	0,048
iper Speed 25	in/sec.	Flow Scale	$\frac{1/A^{\circ, 2}}{gpm/inc}$
essure Scale <u>20</u>	psig/inch	Time Base 500	e <u>ucles</u> / second
.00.9%:	in They have disconnectional and the different intervalsance	Reject:	
mment:			

Repeat Cycle Test	per paragra	ph: <u>5.19</u>	Test Plan Line	Item: FQ-F-14A
25 Cycles		NO.		
Test Par	aneter	Units	Required	Actual
Specimen Temperat	ure	°F	stabilized	57
Test Medium Tempe	rature	°F	ambient	71
Inlet Pressure		psig	80 maximum	67
Flow (GN2)		£3.m	31 maximum	N/A
Actuator Pressure		psig	475	465
Response lime		sec.	Closing	0.017
Paper Spoed	25	in/sec.	Opening N	/A 0.220 gpm/inch
Pressure Sasia		psig/inch	Time Base 500	cucles 1 seconds
50 Cycles	n en er en	our energy	WARM HARPER STREET	
29.1.20 201-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	esservande en	Units	Required	Actual
- Nyeuman - Kanparat		STATE OF A CONTRACTOR OF THE PARTY OF THE PA	stabilized	57
Tesi Milium Grape	igent de engele elegen et en elegen beteelt bestellt en gener bestellt geskelige.	F.	ambient	71
Inlet Preserve	rikustu ngagyari kacamatan karangan menderakan digan dida ari n	DSIK	80 maximum	65
FOR STATE STATE	tin tina nigatia i eraka kirineli ile rane ile helifektelili.	573	31 maximum	N/A
Acta of Emporere	in de la companya de La companya de la companya del companya de la companya del companya de la companya del la companya de la	psig	1:75	465
	eliteral i i de na elektrich i na en		Closing	0.017
Paper 1985 CR	25	· in/sec.	Plow Scale	N/A gpm/inch
Pressure desire		psig/inch	Time Base 500	cycles / seconds
75 Cales				
and the second s	38277-037	Units	Required	Actual
Specimen (3. dom)		er.	stabilized	.59
Test and the der		12	ambient	72
Inlet Propries	Section and the section of the secti	prig	30 maxinum	66
Flow (GM:		£ 41	31 maximum	N/A
Actualm ressure	ST CAR TORING AND TORING	paig	475	465
Response Nime		sec.	closing	0.018
Paper Speed	2,5	in/sec.	Flow ScaleA	/A 0.200 gpm/incl
Pressure Scale		psig/inch	Time Base 500	cycles / seconds

Repeat Cycle Test per paragraph:		Test Plan Line	Item: FQ-F-14A
100Cycles			
Test Parameter	Units	Required	Actual
Specimen Resperature	°F	stabilized	59
Test Medium Temperature	°F	ambient	72
Inlet Pressure	psig	80 maximum	65
Flow (CM2)	erm l	31 maximum	N/A
Actuator Pressure	paig	47 5	465
Response Time	sec.	Closing	0.019
Paper Speed	in/sec.	Flow Scale	NOT RECORDE
Preasure Scale 20	psig/inch	Time Base 500	aycles / second
25 Cycles			
Test Parameter	hits	Required	Actual
Specimen Gemperature	°F.	stabilized	59
Test Medium Temperature	°F	ambient	72
Inlet Pressure	psig	80 maximum	65
Fire (GMP)	};::73	31 maximum	NA
Actuatur line serve	psig	475	465
Response Time	sec.	Closina	0.018
Puper Special 25	in/sec.	Flow Scale 4 N	/A 0.198 gpm/inc
Pressure Scale 20	psis/inch	K.V., (1997) (2) 41 10 10 10 10 10 10 10 10 10 10 10 10 10	cycles/ second
50 Cycles			
Year Parameter	U. its	Required	Actual
Specimen Progerature	(Pr	stabilized	69
Pest Media Temperature	6 7	ambient	7.3
Inlet Preserve	prig	80 maximum	66
Plow (GP2)	FT TO	31 maximum	MA
Actuator Frankle	psig	1 475	465
Response Time	sec.	Closing	0.016
Paper Speci	in/sec.	Flow Scale 19	//A 0.200 gpm/inc
Pressure Scale		Time Base 500	cycles f second

Repeat Cycle Test	per paragre	ph: 5.19	Test Plan Id	ne Item: FQ-F-14A
175 Cycles	de - in complete college o state of the college of	Collo: 1009 Saleste - Olderlags y globaling, vir all Apollo albonio dell'	gyddiod y gaegglaigyndu i'i y gynga Mae' gyddiol gaeglaidiol y gyllyddiol y gyllydd	\$
Mest Par	emeter	Units	Required	Actual
Specimen Telegerat	ure	°F	stabilized	60
Test Mailua Tanga	tature	o.F.	ambient	74
Inlet Fressure		psig	80 maximum	65
Flow (CA2)	otto alla Pro Angeles agressorar	grm	31 maximum	· NA
Actuator Prescup	on the state of th	psig	475	470
Response 7 m	nation	sec.	Closing	0.015
Paper Speed	25	in/sec.	Opening Flow Scale	N/A 0,200 gpm/inch
Pressure Scale	20	psig/incb	Time Base 500	e cucles / seconds
200 Cycles	Committee of the process of the process of the second of t	- cerving vision		
	um tex	Muits	Required	Actual
Opeciado enterra	Worker to be room in a configuration of a section of definition	2 mg	stabilized	61
Tern Brillion Progra		°F	ambient	74
Iniat Post suce	and the second s	peig	80 maximum	65
Nige (Gen)	to Market Appear of the test of the first	67.33	31 meximum	N/A
	ne sananni indi a e e e	1 p.16	475	4/65
ACCORDANCE COME.	وري د المستعدد المستع	sec.	Closing	0.018
Paper Start	25	1n/sec.	Plow Scale	MA 0,196 gpm/inch
Fire a but we said	20	psig/inch	Time Base 5	00 416/05 seconds
225 Cyclec	- Jankson soon - Janksyssele (h. 1844) põhilikkile ka	p control or no like the Michigan Ross has been also been preparation of the control of	equel o « Nome in geographic Ind., quastribulidade Septimbel Indiana (Indiana) (Indian	
Security of the security of th	STOREST CONTRACTOR	ere in company of a communication of the second	Riquired	Actual
Specimen Tem, and	E. C.C.	en vinner i nago, de rescripción minerandomicano suma discussiva.	stabilized	
Test Medic bear r	A GULLE	The second secon	ambient	and the second
Inlet Proceeds	udur da in sekkiring bidi sesukarakan	73518	80 maximum	and the second s
Flow (G/R)	au (1866) i 1866 kilosofe Million - dite (31 maximum	MA
Actuator breasure	To Billy Meegan is Abrilled a special resonance and its conserva-	DS16	475	4/65
Response Come	Company of the compan	sec.	Closing	0.018
Paper Sylvá	25	in/sec.	rica Scale	N/A 0, 202 gpm/inch
Pressure Scale	20	psig/inch	Time Base 500	cyc/e3 / seconds

Repeat Cycle Test	per paragrapl	a: <u>5.12</u>	Test Plan Line	Item: FQ-F-14A
250 Cycles	······································	onorako munikare sissa esa eta kitokaka eta eta oraz	o na postanje sa sekonje na sekonje na postanje se konstrukcija se konstrukcij	gazzas (1923 millantus s Lands en es es es es es es la filla (1924 millantus (1924 millantus (1924 millantus (1
Test Par	ameter	Units	Required	Actual
Specimen Temporat	we	°F	stabilized	61
Test Medium Tenpe	rature	°F	ambient	74
Inlet Practure		psig	80 maximum	64
Flow (Glaz)		erm !	31 maximum	N/A
Actuator Pressure	make the sign of t	rsig	475	465
Response Time		sec.	Closing	0.018
	25	in/sec.	Flow Scale 19 N	0.200 gpm/inch
Pressure Stale	20	psig/inch	Time Base 500	cycles/ seconds
275 Cycles				7
and the second s	·mas tea	Units	Required	Actual
Specimen Transporat		°F	stabilized	62
Test Medium Tempe		2 E	ambient	74
Inlet Procesur	ra national contra questión finalismos español finistrativo de la po	psig	80 maximum	69
Flow (682)	reach i maisch amas ain mean i de i richeau i indean deut i deut arealachta	5775	31 maximum	MA
Section of the Contract of the	i kan miningan melabangan dalam d	psig	l÷75	465
Rear Son	the and the state of the state	060	Closing	0,017
Paper ope -	25	in/sec.	Openino	0.196 gpm/inch
Fressia a licala	20	psig/inch	Time Base 500	cycles / seconds
300 Cycles				- T
Aust 3	and the same	¹ Units	Required	Actual
Specific Tv	ure	a.b.	stabilized	62
Dest Make I may		l o F	ambient	74
Inlet kressars		i paig	80 maximum	63
Flow (CCC)			31 maximum	NIA
Actuator for the	- Important III - Topographic County States	naig.	475	465
Response Fina		sec.	Closing	0.018
enterentember (1966) (1965) de la contrata de la contrata (1965) (1965) (1965) (1965) (1965) (1965) (1965) (19 La contrata (1965) (1965) (1965) (1965) (1965) (1965) (1965) (1965) (1965) (1965) (1965) (1965) (1965) (1965)	25	in /ecc	Flow Scale MA	0./96 gps/inc
		psig/inch	Time Base 500	

Repeat Cycle Test per I	caragraph: .5.19	Test Plan Line	Item: FQ-F-14A
325 Cycles			
Wat Paramete	r Units	Required	Actual
Specimen Temperature	°F	stabilized	63
Test Medium Temperatur	e lop	ambient	74
Inlet Pressure	psig	80 maximum	44
Flow (GNE)	en!	31 maximum	N/A
Actuator Pressure	psig	475	465
Response Mas	sec.	Closing	0,018
Paper Speed	.5 in/sec.	Flow Scale N	/A gpm/inch
Pressure Scale	O psig/inch	Time Base 500	cacles / seconds
350 Cycles			3
Test Fur were	r Units	Required	Actual
Specimen Temporature	Constitution and constitution and and an area of the constitution	stabilized	62
Test Meditos Thaperatur	E L	ambient	74
Inlet Presente	psig	80 maximum	64
Flor (CR2)	(2) - Ar The automatic Article Control of the Article Control (control of the Article Control of the Article Contr	31 maximum	N/A
Actiana Prostire	peig	1475	465
Response 72 me	Sec.:	Closing	0.016
Peper typed 2	5 1x/sec.	Plow Scale A	1/A 0.200 gpm/inch
	O psig/inch	Time Base 500	cycles / seconds
379 Cycles	e November (1888) en de la companya	oog it self-tillitiit 1557 vaan Parilla oo kare tillitiisaa teeleksiistii oo kooliistii ja kooliistii oo ka ta	
POST TO FAIR US	Units	Required	Actual
Specifica Parcos Sure	Company of the second s	stabilized	<u> </u>
Test Holls Translature	F	ambient	76
Inlet Ressure	ESI (80 maximum	43
Flow (GRE)	FS-22 po es acuação no como como como porte de maio de como como como como como como como com	31 maximum	N/A
Actuator Frescore	pois	475	465
Response Time	Sec .	Closing	0.018
Paper Speed	5 in/sec.	Flow Scale N	A 0.197 gpm/inch
Pressure Scale	20 psig/inch	Time Base 500	cycles / seconds

Repeat Cycle Test per paragraph:	5,/9	Test Plan Line	Item: FQ-F-14A
400 Cycles			
Test Parameter	Units	Requir e d	Actual
Specimen Temperature	° _F	stabilized	63
Test Medium Temperature	°F	ambient	75
Inlet Pressure	psig	80 maximum	63
Flow (CN2)	gra	31 maximum	NIA
Actuator Pressure	psig	475	465
Response Time	sec.	Closina	0.019
Paper Speed 26	in/sec.	Flow Scale N	0.200 gpm/inch
Pressure Scale 20	psig/inch	Time Base 500	Cicles / seconds
425 Cycles			
Test Parameter	Units	Required	Actual
Specimen Temperature	°F	stabilized	65
Test Medium Temperature	°F	arbient	75'
Inlet Pressure	psig	80 maximum	63
Flow (GN2)	gra	31 maximum	N/A
Actuator Frensure	psig	475	462
Response Time	sec.	Closing	0.019
Paper Speed 25	in/sec.	Opening Flow Scale N	0.192 A gpm/inch
Pressure Scale 20	psig/inch		CACTES / seconds
+50 Cycles			<i>y</i> .
Test Parameter	Units	Required	Actual
Specimen Tompurature	l °F	stabilized	66
Test Media Temperature	°F	ambient	75
Inlet Pressure	peig	80 maximum	6.3
Flow (GNE)	FDEL	31 maximum	N/A
Actuator Pressure	psig	475	460
Response Time	sec.	Closing	0.018
Paper Speed 25	in/sec.	Flow Scale N	/A 0.200 gpm/incl
Pressure Scale 20	psig/inch	Time Base 500	cycles / second

depeat Cycle Test per paragraph:	_5.11	Test Plan Line I	tem: PQ-Z-14A
1 Cycle	international contraction of the	re de reconse conseque may en termograpo que positivo transportante de la conseque del la conseque de la conseq	
West Parameter	Units	Required	Actual
Chamber Temperature	°F	+160	160
Specimen Temperature	**	+160	155
Inlet Pressure	psig	80 maximum	62
Flow (GNZ)	87.00	31 maximum at 160°F	MA
Actuator Pressure	psig	¥75	380
Response Time	sec.	Closing	0.017
Paper Speed 2	in/sec.	Plow Scale W/	0.108 A gpm/inch
Pressure Scale 20	psig/inch	Time Base SCO C	<i>u_c.les I</i> seconds
2 Cycles			→
Test Parameter	; Units	Required	Actual
Chamber Temperature	°F	+160	160
Specimen Temperature	**************************************	+160	159
Inlet Pressure	psig	80 maximum	74
Flow (GE2)	gpa	31 meximum at 160°F	NA
Actuator Pressure	psig	475	420
Response Time	S&C .	Closing	W.417
Paper Speed	in/sec.	Flow Scale W	A 0.108 gpm/inch
Pressure Scale 20	psig/inch	Time Base 500 Ca	. 1
3 Cycles			
Test Parameter	Units	Required	Actual
Chamber Temperature	o p	+160	160
Specimen Temperature	°F	+160	/#7
Inlet Pressure	psig	80 maximum	61
Flow (Gilg)	gon	31 maximum at 160°F	/// A
Actuator Pressure	psig	475	450
Response Time	sec.	Clasing	4. 217
Paper Speed	in/sec.	Openian	/A 0.108 gpm/inc
Pressure Scale	psig/inch	the state of the s	cycles / second

epeat Cycle Test Per Paragr	apo:	_Test Plan Line Item:	FQ-F-14A
Cycles Test Parameter	I had do a	Should not do	A - d 7
Test Laraneter	Units	Required	Actual
bamber Temperature	°F	+1.60	160
pecimen Temperature	o _F	+160	156
nlet Pressure	psig	80 maximum	61
low (GM ₂)	gran	31 meximum at 160°F	N/A
ctuator Pressure	psig	475	950
esponse Time	sec.	Clasins	0.0//
per Speed Z	in/sec.	FLOW Scale 3 N/A	C./08 gpm/ind
espare Moals <u>ZO</u>	psig/inch	Time Base <u>SOO</u> C	y clas / second
Oyole:		,	* /
Mark Parameter	Units	Required	Actual
Lamber Temperature	O.F.	+160	160
ye fran Ropprature	°r	+1.60	/56
Diel fres 200	1% 16	80 meximum	59
Q. (1978) 1978) 1	82.87	1 maximum et 160°F	7///
Charles Incharge	\$V:18	L-75	400
os otas Car	sec.	Closing	0.017
par 19600 2	in/sec.	FLS Scale 3 N/	O. / Po
ezerin kasia Zo	p_i _{6/} inch	Time Base \$00 c.	seles / second
		to the same of the	
Control (1997) New York Control (1997) New Y	encelle centre del prospone e componentation in algume and acceptations are against anti-calability.		
Pest Impanater	Uaits	Required	Actual
ham. or Torgorature	^O p	+160	160
proimem Wempernture	° _p	+1.60	150 6
nes error	psig	80 maximum	37
100 (6%)	gpm	21 maximum at 160°F	N/A
ctuator Pressure	psig	475	473
come a desercione fil. In a sessimilar effectada inclusionada i a his appropriatorio producto montpesso, con que me mestro programmento.	sec.	Clasing	0.017
esponse Time			
tesponse Time open Speed 2	in/sec.	Flow Scale W/	0./08 A grm/inc

Repeat Cycle Test Per Paragraph:	5.19	Test Plan Line Item:	FQ-F-14A
7 Cycles			
Test Parameter	Units	Required	Actual
Chamber Temperature	°F	+160	160
Specimen Temperature	o _F	+160	156
Inlet Pressure	ps ig	80 maximum	57
Flow (GW ₂)	gpm	31 maximum at 160°F	NIA
Actuator Pressure	psig	475	473
Response Time	sec.	Closins	0.017
Paper Speed 2	in/sec.	Opening N/	0,/08 A gpm/inch
Pressure Scale 20	psig/inch	Time Base 500 cc	6 1
8 Cycles		•	
Test Parameter	Units	Required	Actual
Chamber Temperature	o _F	+160	160
Specimen Temperature	o _F	+160	157
Inlet Pressure	psig	80 maximum	57
Flow (GM ₂)	gpm	31 maximum at 160°F	NA
Actuator Pressure	' psig	475	470
Response Time	sec.	clasing	0.017
Paper Speed 2	in/sec.	Flow Scale N	A gpm/inch
Pressure Scale LO	psig/inch	Time Base 500 Ca	16/es seconds
9 Cycles		•	
Test Parameter	Units	Required	Actual
Chamber Temperature	$\circ_{ m F}$	+160	160
Specimen Temperature	$\circ_{\mathbf{F}}$	+160	157
Inlet Pressure	psig	80 maximum	57
Flow (GN ₂)	gpm	31 maximum at 160°F	N/A
Actuator Pressure	psig	475	473
Response Time	sec.	clasing	0.017
Paper Speed 2	in/sec.	Opening N/A	0./08 gpm/inch
Pressure Scale 20	psig/inch	Time Base 500 Cu	icles seconds

Repeat Cycle Test Per Paragraph	: <u>5.19</u>	Test Plan Line Item:	PQ-F-14A
,lo Cycles			
Test Parameter	Units	Required	Actual
Chamber Temperature	o ^k	+160	160
Specimen Temperature	$\circ_{_{ m F}}$	÷160	157
Inlet Pressure	psig	80 maximum	<i>87</i>
Flow (GM ₂)	gpa	31 maximum at 160°F	11/4
Actuator Pressure	psig	475	413
Response Time	sec.	·dosing	0.017
Paper Speed	inch/sec.	Flow Scale 3 N/	0. 108 A gpm/incl
Pressure Scale 20	psig/inch	Time Base 500 6	Acles / seconds
4	•	en e	
11 Cycles	*		proceedings on the second seco
Test Parameter	Units	Required	Actual
Chamber Temperature	o _F	+160	160
Specimen Temperature	o _F	+160	158
Inlet Pressure	psig	80 maximum	<i>57</i> .
Flow (GN ₂)	gpm	31 maximum at 160°F	MA
Actuator Pres ure	psig	475	473
Response Time	sec.	Clasing	0.017
Paper Steed	in/sec.	Flow Scale	9./08 grm/incl
Pressure Scale 20	prig/inch	Time Base 500 C	
produce former for the 20 total deputy of the 10 total former for the 10 total former former.	Surfficient Co. V	gamente como, a se facilidad filles dell'escapique melle un dell'escapique delle un dell'escapique delle un del	
12 Cycles	guard manufasan dhaqaan jaar marii marii yaasa dhaqaa dhiidhan hayaa angaayan aasa hiid dhaqaa i	nandfaster traditional - transparace and some a - water that and -	
Test Perameter	Units	Required	Actual
Chember Temperature	°F	+100	160
Specimen Temperature	°F	+160	158
Inlet Pressure	psig	80 maximum	57
Flow (GM ₂)	Spin .	31 meximum at 160°F	NIA
Actuator Fressure	psig	475	472
Response Time	sec.	Closina	0.011
Paper Speed 2	in/sec.	Flow Scale S N/A	0. /05 gpm/inch
Pressure Scale 30	psig/inch	- The state of the	second

Repeat Cycle Test Per	Paragraph:	5.19	_Test Plan Line Item:	FQ-F-14A
13 Cycles				
Test Parameter		Units	Required	Actual
Chamber Temperature		°F	+1.60	160
Specimen Temperature		o _F	+160	/\$8
Inlet Pressure		psig	80 maximum	57
Flow (GM ₂)		gra	31 maximum at 160°F	MA
Actuator Fressure		psig	.475	472
Response Time		sec.	C/osing	0.015
Paper Speed	2	in/sec.	Flow Scale N/	0./05 gpm/incl
Pressure Scale	20	psig/inch		cacles / seconds
and a copin depression of the second	P. Control of the Con	•	Book and the Committee of the Committee	
14 Cycles				T :
Test larameter		Units	Required	Actual
Chamber Temperature		o _F	+160	160
Specimen Temperature		o _F	+160	158
Talet Pressure		<u>psig</u>	80 maximum	57
II. (72)		gran	31 maximum at 160°F	N/A
Actuator Freesure		psig	475	472
Responsa Time		sec.	Clasing	0.015
Paper Speed	2	in/sec.	Flow Scale 3	0./05 gpm/incl
Pressure Scale	20	psig/inch	Time Base 500 c	4 chs / seconds
	as (Medil Albiert Medil), que for efficience au abacullas que francés	. – ••	ages afternoonly for afternoonly for afternoonly for afternoonly for afternoonly for	7-7-
15 Cycles Test Parameter		Units	Required	Actual
manageringsattanist tarrings in garageatann aan torra aana - ah tahur ir hin oo aar isaar jihan har hir or maaan			4	
Chamber Temperature	.ph.+co.p+**charless	o _F	+160	160
Specimen Temperature		o _k	+160	158
Inlet Pressure		psig	80 maximum	Nor Received
Flow (CM2)		gpm	31 maximum at 160°F	N/A
Actuator Pressure		psig	475	NOT RELEASED
Response Time		sec.	~-	NAT RELADED
Paper Speed Hung	UP	in/sec.	Flow Scale N	A gpm/incl
Pressure Scale Nor			Time Base Not Res	Constitution of the contract o

5 Cycles	innepoli <mark>s</mark> nominanta i sikus Oleanika, ett prikinkys i slagnejskihilikoni st kinosuse e si	rikangingal dan ilangkangin kanan kangkangan mengapakan kepadapakan dan mengangganggangganggan kanan menangka	***************************************
Rent Durana Cat	Units	Required	Actual
Chamber Temperature) F	+160	160
dpecincu Properature) F	+160	158
Miles () 224-8620	psis	80 maximum	57
73.54 (OX. ₂)	8,021	31 reximum at 160°F	N/A
an han in the second of	psig	1475	472
Berpouse Take	sec.	Closina	0.015
oner against 2	un/cee.	Flow Scale no N/A	O./25 gpm/incl
6 3 7478 346 20	pels/inch	Time Base 500 cu	
A CONTRACTOR OF THE CONTRACTOR	Constant of Children C. P.		7
The following the second second second on the second secon	Augustaff departique and description of the Alberta State of the State		The same of the sa
The second of the Third Control of the Control of t	Unite	Required	Actual
Character Company Chira	o ^k .	+16 0	160
Note that the second of the second	°,	+166	159
The second secon	psig	30 maximum	57
		31 maximum at 160°F	MA
The Marie Medical Medi	1-16	. 1.75	470
	.20.	Closing	0.015
arear need 2	ip/sec.	Flow colons N/A	0./05 gm/ine
res has sold ZO	psig/inch	Time Baro 500 Ca	The same of the sa
A CONTRACTOR OF THE PROPERTY O	manage was as 100 miles (1998)	Live Sand Sand Sand Control	
	rana angga at taun ana ana an	 Sp. 1/2 is happy comes intercent only intercent and considered in the c	egen manningar a statuer — remainingar return entiremente return architectur describer ann metapat
Control of the second of the s	i Unit:	Required	Actual
Consider of the months of the constant of the	्र	+100	160
gravita fin outstand	94	+160	160
TARANA MARANA	jeig.	80 maximum	57
Flow (GM.)	g pm	31 maximum at 160°F	N/A
Actuator Process	psig	475	470
Pespace liter	see.	Closing	0.015
contraction (Co. 1995 across the 1996 Co.). Ambien the 1996 Co. (March 2000 or presentation of the 1996 of the 199	in/sec.	Flow Scale 3 N/A	0, /05 gpm/inc
uper gred			

Repeat Cycle Test Per Par	agraph: 5.19	Test Plan Line Item:	FQ-F-14A
19 Cycles			
Test Parameter	Units	Required	Actual
Chamber Temperature	° _F	+160	160
Specimen Temperature	o _F .	+160	160
Inlet Pressure	ps ig	80 maximum	56
Flow (GM2)	gpm	31 maximum at 160°F	NIA
Actuator Pressure	psig	475	470
Response Time	sec.	C/osing	0.015
Faper Speed 2	in/sec.	Flow Scale N/A	0./05 gpm/inch
Pressure Scale 20	the the sufficient of the country of the sufficient of the suffici	Time Base 500 Ou	clas / seconds
E. A. V. D. C. College Communication and Communication and College Col	and the second s	<u> </u>	,
20 Cycles			A - do - 9
Test Parameter	Units	Required	Actual
Chamber Temperature	$^{\circ}_{ m F}$	+160	160
Specimen Temperature	°F	+160	161
Inlat Pressure	psig	80 _{maximum}	56
Flow (382)	gpm	130 maximum at 160°F	N/A
Actuator Pressure	psig	475	470
Response Time	sec.	Closing	0.015
Paper speed	in/sec.	Flow Scale N/F	0./os gpm/inch
Pressure duelo 2	Control of the contro	Time Base 500 w	seconds
que double color double - resulting designation	Office and comment of the comment of	•	<i>,</i>
21 Cycles	T. T. a. d. d	Required	Actual
Test Varameter	Units		4
Chamber Temperature	F	+160	160
Specimen Temperature	° _F	+160	160
Inlet Pressure	psig	80 maximum	56
Flow (GN ₂)	gpm	31 maximum at 160°F	MA
Actuator Pressure	psig	475	465
Response Time	zec.	Closing	0,015
Paper Speed Z	in/sec.	Flow Scale 9 N/	0.105 A gpm/inc
	O psig/inch	Time Base 500 c	y cles / second

Repeat Cycle Test Per Paragraph	<u> </u>	_ Test Plan Line Item:	FQ-F-1LA
22 Cycles			
Test Parameter	Units	Required	Actual
Chamber Temperature	o _F	+160	160
Specimen Temperature	o _F	+160	161
Inlet Pressure	psig	80 maximum	. 5%
Flow (G%2)	grín	31 maximum at 160°F	N/A
Actuator Pressure	psig	475	460
Response Time	sec.	Closina	0.016
aper Speed 2	in/sec.	Flow Scale N/A	0./06 gpm/inc
Pressure Scale 20	psig/inch	Time Base \$00 cu	
-			/
3 Cycles	Anadro-missa ilipaininini kandisa disenti mefilia ilipaini merika ili		A . A
Test Parameter	Units	Required	Actual
Chamber Temperature	o _F	+160	160
Specimen Temperature	o _F	+160	159
Inlet Pressure	psig	80 maximum	56
Flow (GM ₂)	gpm	31 maximum at 160°F	MA
Actuator Pressure	poig	475	460
Response Time	sec.	Closing	0.017
aper pred 2	in/sec.	Flow Scale N/A	0.107 grm/ind
record tool. 20	r.ig/inch	Time Base \$00 cc	cles / second
		Copy	».
k Comment	diagnosistes in conservative rich set resentes in contentarion essentiale rich	entre en concreto una unimidate electricado este entre disconecio, electricado este electricado entre	A I
Test Paremeter) December 1	
e come - e	Units	Required	Actual.
Constant Tenaretur	og	Required +160	160
	ofenender of their control special experience of the southern control time of the second control to the second		rantas en la contra en esta en la contra appara de la contra antiqua de la contra antiqua de la contra antiqua La contra de la contra antiqua de la contra antiqua de la contra antiqua de la contra antiqua de la contra de
Speciaca Pemperature	og	+lč0	160
	o _p	+1€0 +160	160
Speciese Temperature Inlet trescare	o _F	+160 +160 80 maximum	160
Speciasa Temperature Inlet trescare Flow (GMg) Actuator bressure	o _F o _F Fals	+160 +160 80 maximum 31 maximum at 160°F 475 Closing	160 160 56 N/A
Flow (GN ₀)	o _F o _F Folk gom Fris	+160 +160 80 maximum 31 maximum at 160°F 475	160 160 56 N/A 458

Repeat Cycle Test Per Paragraph	n: 5,19	Test Plan Line Item:	FQ-F-14A
25 Cycles			·
Test Farameter	Units	Required .	Actual
Chamber Temperature	o _F	+16 0	160
Specimen Temperature	o _F	+160	160
Inlet Pressure	psig	80 maximum	64
Flow (G%2)	gpm	31 maximum at 160°F	N/A
Actuator Pressure	psig	475	475
Response Time	sec.	c/osing	0.0165
Faper Speed 2	in/sec.	Opening Flow Scale ///	O./09 gpm/inch
Pressure Scale 20	psig/inch		clas / seconds
und de misse van de selection d		7	7
26 Cycles			
Test Parameter	Units	Required	Actual
Chamber Temperature	°F	+160	160
Specimen Temperature	°F	+160	160
Inlet Pressure	psig	80 maximum	8 &
Flow (CR ₂)	gpm	31 maximum at 160°F	N/A
Actuator Prescure	psig	475	470
Response Time	sec.	Closing	0.017
Paper Speed 2	in/sec.	Flow Scale N/A	0,/08 gpm/inch
Pressure Scale 20	psig/inch	Time Base 500 .c	4 4
27 Cycles	and the state of t		
Test Farameter	Units	Required	Actual
Chamber Temperature	°F	+160	160
Specimen Temperature	o _F	+160	160
Inlet Pressure	psig	· 80 maximum	55
Flow (GN ₂)	gpm	31 maximum at 160°F	MA
Actuator Pressure	psig	475	462
Response Time	sec.	C/ esing.	0,017
Paper Speed 2	in/sec.	Flow Scale V/F	0./09 gpm/inch
Pressure Scale 20	psig/inch		y cles / seconds

Repeat Cycle Test Per Paragr	aph: <u>5./9</u>	Test Plan Line Item:	FQ-F-14A
28 Cycles			
Test Parameter	Units	Required	Actual
Chamber Temperature	°F	+160	160
Specimen Temperature	°F	+160	159
Inlet Pressure	psig	80 maximum	54
Flow (GM ₂)	gpu	31 maximum 160°F	MA
Actuator Pressure	poig	475	472
Response Time	sec.	Closing	0.017
Paper Speed 2	in/sec.	Opening N/A	0./08 gpm/inch
Pressure Scale 20	psig/inch	Time Base 500 Cu	
		٠ا	/
29 Cycles Test Parameter	Units	Required	Actual
Chamber Temperature	OF	+160	160
Specimen Temperature	$\circ_{\mathbf{F}}$	+160	160
And the second section of the section of the second section of the section of the second section of the s	poda	80 maximum	62
Inlet Fressure Flow (GR ₂)	psig	31 maximum at 160°F	.77.
Actuator Pressure	gpm	475	470
And incrementation (- 19-1). An province of a province incrementation of the confidence of the confide	an markenske politice o de grande grande grande en de grande grande en de grande grande grande grande grande g		
Response Time	sec.	Flow Scale N/	0.017
Paper Speed 2	in/sec.		gpm/inch
Pressure Scale 20	psig/inch	Time Base 500 Co	seconda
30 Cycles			
Test Parameter	Units	Required	Actual
Chamber Temperature	°F	+160	160
Specimen Temperature	°F	+160	160
Inlet Tressure	psig	80 maximum	63
Flow (GE2)	gpm	31 maximum at 160°F	N/A
Actuator Pressure	psig	475	470
Response Time	sec.	Closing	0.011
Paper Speed 2	in/sec.	Flow Scale N/	4 0./08 gpm/inch
Pressure Scale 20	psig/inch	Time Base 500 c	ycks/seconds

Repeat Cycle Test Per Paragrap	oh: <u>5.19</u>	Test Plan Line Item:	FQ-F-14A
31 Cycles	,		
Test Parameter	Units	Required	Actual
Chamber Temperature	o _F	÷160	160
Specimen Temperature	o _F	+160	160
Inlet Presoure	psig	80 maximum	63
lson (claso)	g)xn	31 maximum at 160°F	MA
Actuator Pressure	psig .	475	465
Response Time	sec.	C/Osing	0.017
Paper Speed 2	in/sec.	Opening N/	0./08 9 gpm/inch
Pressure Scale 20	psig/inch		cles / seconds
20 6		7	,
32 Cycles Test Parameter	Units	Required	Actual
Chamber Temperature	o _F	+160	160
Specimen Temperature	o _F	+160	160
Inlet Freesure	psig	80 meximum	62
Flow (GMg)	gpm	31 maximum at 160°F	MA
Actuator Preseura	psig	475	468
Rocporue Cime	can.	C/asing	0.017
Paper Speed 2	in/see.	Flow Scale N/A	0,/08 gpm/inch
Pressure Roals 20	psig/inch	Time Base 500 eq	cles / seconds
33 Cost a		~	,
33 Cycle: Sest Farameter	Units	Required	Actual
Chamber Temperature	J.F.	+160	160
Openfamen Temperabuse) °F	+160	159
	2004	80 maximum	βã
V.50 (6%)	£ Da:	31 maximum at 160°F	MA
hataribec medales	Frisk	¥75	465
Response Time	36C.	Closing	0.017
Paper speed 2	in/ we.	Flow Scale N/A	0./08 gpm/inch
ires, use Joste 20	put / inch	Time Base 500 cu	cles / second.

4 Cycles Rest Paramet	party.	Units	Required	Actual
kanggaparang digapar dipakerdir strap ya ipang digapa kipina risan Pilipat Kansi Pilini Misimboy sa	erinar e parameros, sellar reconstrucción con un un un un acasada en ella sella della dell			
Chamber Temperat	ure	°F	+160	160
Specimen Tempera	ture	o _F	÷150	/59
lither browstare	ne - vermonte nom deminimant	psig	80 meximum	63
rlov (UM ₂)	Angle of the American Committee of the	Ebs:	31 maximum at 160°F	N/A
entral Park Property		palg	475	465
Monta - May	processor in the contract of t	. cec	C/Esing	0.017
ere most	2	in/sec.	Flow Scale N/	<i>O.</i> /08 }grm/inc
ee ang eak		psig/inch	Time Base 500 cy	
N1 0	e i i i i i i i i i i i i i i i i i i i	area shasoning a 1		7
S C S The same of	ericio E Charll acc Pro fractions and Mark	adding dash daggan dashing paganan, share e hay pilo cantinon on the hollowing management was the con-	ing i angla mbasa sariminasana alagamin. Masalman da dhasa in shi i aranka dhasa bha bhardha	and the second seco
چە ئەچەنى ۋۇرىچ ئەڭ ئاتارىخى سىسىنىنىڭ ئىلىدى	The second of th	Units	Required	Actual
These respond	Str.	, y	+160	160
jereta i sijaasa	\$ 633° 3	° _F	+160	159
	rak ki kiraki di kiraki ki kiraki da manaka k	10.36	80 meximum	63
	an and the second section of the second seco	222	31 maximum at 160°F	<i>N</i> /A
		rie	475	465
	a second design, to record a commission substitute of	Sec.	Closing	0.017
€ tire!	2	is, sec.	Plov scale N/A	0./08 gpm/ind
n de la sul	20	psig/lbck	Time Base 500 cu	
	Control of a particular report of the control of th	man and a second se	(activistic state and activistic state and activist	
	1955 1951 to appear an other times and	and the regulation of the same and the same	t.	والمراقب والمراقب والمراقب والمراقب والمراقبة والمراقبة والمراقبة والمراقبة والمراقبة والمراقبة والمراقبة والم
ida a Marine a ili		Jalta	Required	Actual
Down a literat	ka ?	<i>.</i>	+160	160
igner baro (Senjera)	Laro	2.5	+160	/58
Import to making	and the second s	ra.1g	80 maximum	62
las (%)	es verso intellociologico (habito diferencia).	gpm	31 maximum at 160°F	NA
roimeson indepar	The state of the s	roig	475	465
e tanto de la propio de la comprese e	all of the second section of the second seco	g yn drod der <mark>g</mark> enet au artig athaea rt hrau thail 6 ; 4; 6; a fhliair Mhagathraidh ; 76° ; - 7		eringander er blever den er blever blever er bette bei Met paut den er besenderen etter i den er ver i ver de Te
Besprase Time		aee.	Closing	0,017

Repeat Cycle Test Per Paragraph:	5.19	Test Plan Line Item:	FQ-F-14A
37 Cycles			
Test Parameter	Units	Required	Actual
Chamber Temperature	o _F	+160	160
Specimen Temperature	$\circ_{\mathbf{F}}$	+160	/58
Inlet Pressure	psig	80 maximum	62
Flow (GM2)	gþw	31 maximum at 160°F	N/A
Actuator Pressure	psig	475	470
Response Time	sec.	Clasing	0.017
Paper Speed 2	in/sec.	Flow Scale N/	0./08 4 gpm/inch
Pressure Scale 20	psig/inch		oles / seconds
38 Cycles Test Parameter	Units	Required	Actual
Chamber Temperature	$\circ_{\mathbf{F}}$	+16 0	160
Specimen Temperature	° _F	+160	/58
Inlet Programs	psig	80 maximum	63
Flow (GM ₂)	gpm	31 maximum at 160°F	MA
Actuator Frankure	psig	475	468
Response Time	sec.	Closing	0,017
Payer uperd 2	in/sec.	Flow Scale 9 N/A	0./08 gpm/inch
Preusare deale 20	rsig/inch	Time Base 500 cue	les / seconds
and the first state of the stat			
30 Cycles	омбортова част Мента это это и македат такжения на общения		
Test Paremoter	Units	Required	Actual
Chamber Temperature	o ^k	+1.60	160
Specimen Temperature	$\circ_{\mathbf{F}}$	+160	/58
Inlet Pressure	pulg	80 maximum	62
Flow (GMS)	gpm	31 maximum at 160°F	N/A -
Actuator Pressure	psig	475	465
Response Time	sec.	Clasing	0.017
Faper Opeed 2	in/sec.	Opening W/	0./08 4 gpm/inch
Pressure Ceale 20	_psig/inch		Acles / seconds

Repeat Cycle Test	Per Paragra	ph- 5.19	Test Plan Line Item: _	FQ-F-14A
O Cycles	Popupha, No Stade Shape White he had no Admittation - the administration below on			
Test Paramete	r	Units	Required	Actual
Chamber Temperat	ure	°F	+160	160
Specimen Tempera	ture	o _F	+160	159
Inlet Pressure		psig	80 maximum	63
Flow (GE ₂)		g con	31 maximum at 160°F	NA
Actuator Prescur	e	psig	475	468
Response Time	E tot halaset seen, a de en en gelte, elleragette et maaktemelijaanske en en e	sec.	Closing	0.017
nper of other	2	in/sec.	Opening N/A	©./08 gpm/incl
rescura .wale		psig/inch	Time Base 500 Cy	
1 Cycles		art and the second of the seco	andres of the supplication	
Tost Paramete	right. La	Units	Required	Actual
Chamber Temperat	ure	C	+160	160
Specimon Tempera	ture	° _F	+160 ·	159
lnies François	ng sang sanggangan, at tit ka ang ki sa kanadah dalah dan	psig	80 maximum	62
Fig. (9%)	ng - 15 od Systellion oresten som väng perinnstagge Sillen och a ellektor	gpm	31 maximum at 160°F	N/A
Actuator fractur	i gille Speri Borthon harris sono e sonog este politikanitani dan parate e sina	psig	475	465
Resonce Time	ь <i>- эт</i> тем по т е ть приветниковающие на ант перево	sec.	C/osing	0.017
apor speci	2	in/sec.	Flow Scale N/A	<i>O./0€</i> gpm/incl
ressure foale	20	psig/inco	Time Base 500 cu	*
			•	•
<u>2 Typles</u> Test Haramete	graphic record as an international and an internati	Unit s	Required	Actual
Chamber Temperate	ure	o _r	+160	160
Specimen Tead to	na ar ne ny symanagyah salasi Jaco ne ara-panyuhaya	° _F	+1.60	159
Inkat kressers	v ja d. Sid. negrapinete veltynyytettä tälääjä sälletennivavillissa mittyvalenteis	r ig	80 maximum	63
Flow (GM ₂)	onnego certy), certife eller, sin enfección refillacións almagathas	gym	31 maximum at 160°F	NA
Actuator Proper	nick water entligen and tree misse or whole the author the little water the little of	Poiss	1 46	465
Faston e Circ	and the second s	29.32	clasing	0.017
the control of the co	2	in/15c.	Flow Icale NA	0. /08 gpm/incl
	and the second of the second o	THE RESERVE OF SECURITY COST CONTRACT	Time Base 500 cyc	CARROLLIAN STATEMENT STATE

epeat Cycle Test)	Per Paragraph	5.19_	_Test Plan Line Item: _	FQ-F-14A
3 Cycles	nak, usaga ortifor for com professorania ortifors of combination of combinations of		n san da san ang ang ang ang ang ang ang ang ang a	
Test Parameter		Units	Required	Actual
Chamber Temperatur	re	Op	+160	160
Specimen Temperati	ire	°F	+160	160
Inlet Pressure	una paga - minima matan unaya - masa magapa da gariferan day ya fata - daha da	psig	mumixem 08	63
Flow (GR ₂)		gpm	31 maximum at 160°F	N/A
Actuator Pressure		rsig	475	470
Mesponie Tire	i mai i sagant haji shinkeri — gi himi shqiqara ngayayiti kan hajibati shiqibati shiqibati shiqibati shiqibati	sec.	Closing	0.017
aper Depen	2	in/cec.	Opening Flow Scale W/	0,07 gpm/incl
recours leafs	30	psig/inch		cles/seconds
				j
4 Cycles That Forameter	19 - Scholand (n.) shadolin admirro N. 19 (19 millional danse)	Units	Required	/.ctual
The control of the co	gine i ving tron. 1962 tip gettigsgripe hav allesetter subsention			
Chamber Temperatu	الأميرات] المستوفف عدد والمدين مواهليون ما فالمستوف الموادون الماليون والموادون الماليون والموادون الموادون الماليون)°F	+160	160
Specimen Temperati	ne	°F.	+160	160
Laber Die ouer	ng (ng. 5 - pain tha a s a comhan a dhligh d'ipin dha a commande a driven ann ga d	<u> </u> psig	80 maximum	62
Plos (SN2)	an an indication of the control and an analysis of the control and analysis of the control and an analysis of the control and analysis of the control and an analysis of the control and a	gpm	31 maximum at 160°F	N/A
Lober & Follows		psig	475	470
Brolowin C.A.		zec.	Closing	0.017
RIEL INCO	2	in/mec.	Flow Scale 3 N/A	0.106 gpm/inch
real and the		psig/inch	Time Base 500 cy	
			7	/
Socied	o o o o o o o o o o o o o o o o o o o	ومناوية والمراجعة		<u> </u>
test manufact dest	n ege sagung 1917 i Sant santanan managa sagunggan endirekti den dadakka ka	Unite	Required	Actual
Chamer Teageratu		· _F	+160	160
Specimen Temperatu	17e	° _F	+160	160
Inlet Pressure	— 19. 19. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10	psig	80 meximum	62
FLow (GM ₂)		gra	31 maximum at 160°F	N/A
Setuacer Progrume	· · · · · · · · · · · · · · · · · · ·	prig	475	470
	erentager are over measurement effective as an		C/osing	0.017
Response Nime		sec.	S could be my canad	9 9 9
Response Time Paper Speed	2	in/sec.	Flow Scale 9 N/	0.105

Cycles			
Test Parameter	Units	Required	Actual
bamber Temperature	°F	+160	160
Specimen Temperature	°F	+160	160
nlet Pressure	psig	80 maximum	63
low (GN ⁵)	gpm	31 maximum at 160°F	N/A
ctuator Freesure	psig	475	470
esponse Time	sec.	C/asing	0.017
per ged 2	in/sec.	Flow Scale N/A	<i>O. 105</i> gpm/i
essure Scale 20	psig/inch	Time Base 500 Cu	s
entende i visita i i i i i i i i i i i i i i i i i i	Scotter a desput	M.M.	, ,
'Cycles			
Test intemeter	Unite	Required	Actual
hamber Temperature	° _F	+160	160
pecimen Temperature	o _F	+160	160
niet Francisco	l psig	80 maximum	62
	Rom	31 maximum at 160°F	NA
ctus our Securities	psig	475	470
espupe Time	sec.	Closing	0.017
per Grei 2	in/sec.	Flow Scale N/A	0./06 gpm/i
23.33 n (20) 20	reig/inch		Acles / seco
(`	J /
- Crob-saramoter	Unit:	Required	Actual
homes Comporature	7.8	+160	160
povinon Tomy erature	O _R	+160	160
nlet knowere	paig	80 maximum	62
low (GW2)		31 maximum at 160°F	N/A
errana, thosana	gpm	31 acazimum ac 200 r	470
esponse Time	sec.	C/esing	0.017
		Opening	0.706
per byseed 2	in/sec.	Flow Scale N/A	gpm/i

Repeat Cycle Test Per Paragra	ph: 5.19	Test Plan line Item:	FQ-F-14A
49 Cycles			
Test Parameter	Units	Required	Actual
Chamber Temperature	°F	+160	160
Specimen Temperature	$^{\circ}_{ m F}$	+160	160
Inlet Fressure	psig	80 maximum	62
Flow (GE ²)	gpm	31 maximum at 160°F	MA
Actuator Proceure	psig	475	470
Response Time	sec.	Closing	0.017
Paper Speed 25	in/sec.	Flow Scale N	0.098 A gpm/inch
ressor totale 20	psig/inch	Time Base 500 cuc	ks / seconds
50 Cycles		,	/
Test Parameter	Units	Required	Actual
Chamber Temperature	°F	+160	160
Specimen Temperature	² F	+160	159
Inlet Pressure	psig	80 maximum	30
Flow (GML)	gpm	31 maximum at 160°F	MA
Actusum Francure	psig	475	475
Response Time	sec.	Closing	0.017
Paper Cores	in/pec.	Flow Scale N	A gpm/inc
Pressure table 20	psig/inch	Time Base <u>Soo ca</u>	Aclas / second
Necept:		Roject:	<i>J</i>
Comment:			
(c) 1.2 Contract Contract (in the united contract of the Contract Contract of the Contract	a Albertonia. La Albertonia estra esta sentra del meste esta esta esta esta esta esta esta	e en	
and approximate of the original types of the property of the property of the original ori	and a street William April Community of the street of the		andre et en
INTERPORTED PROPERTY OF THE PR	anglin, artin alim panggapagan yang karanggapan artin di dinanggapan sa		aan ta'u ahaa ahaa ahaa ahaa ahaa ahaa ahaa a
odko – sekola ki ki kilo (1821),			

Item Name: 1.02 Chilldown Si	7strm Shutoff Valve		
Part Number: 1A49965-521			
Test Procedure Drawing No:	1407783	Change Letter:	C
Manufacturer's M/N: 020	7 Test Pla	n Line Item: FQ-F	'-14A
Test laboratory: REECH A	KERAFT Location	: Busider, C	010/100
Douglas Test Representative:		,	
Test Witness: Dougle	as Q.C.	Customer	•
Proof Pressure Test Per Parag	graph: <u>5.9</u>	POST REPER	BI Cricile TE.
Test Specimen No:	n Na uters negative stranking deconstruction		
Test Start (Date, Time):	0-21-66, 1316	; }	
Test Completed (Date, Time):			
Ambient Boom Conditions:	T-mperature OF	RH 	Atm. Press. In. Hg abs.
	72	24	611.5 m
Valve Body	- Mar and Copples of Martingham and the State of the Stat		nativity is and any first confusion for the delication and the delication of the del
Peru teatine tea	Units	Required	Actual
Tempera cur-	F	-300 (±20)	-288
Pressure	3 '	190	190
Tine	minutes		5
Setuator			
Tet Parmeter	Units	Required	Actual
Temperatur:	O _F	Ambient	64
Pressure	psig	750	750
Time	minutes	5	5
Accept:		Reject:	
Comments:	analores a		
CORRECTION:	general Marian der se grande ere kjuddelinde der som unterplet i i destateste stätliche ere kreutende er det s		**************************************
entra disampany, artin 100 km, ila ini mini ya insi 14. I anish insi 14. I anish ila ingaha kariba manbarkasi m	unique man A. Cas e Piper Rese. Republicantique requiribusation que confidencia este atilitate describeration	Mir Mir and Barrier and the adding a district and the angle and another and the adding and the adding and an a	
	er e		

Item Name: LO ₂ Chilldown	System Shutoff Va.	lve	
Part Number: 1A49965-521			
Test Procedure Drawing No: 1	r07783	Change Let	ter: C
Manufacturer's S/N: 0201	Test	Plan Line Item:_	FQ-F-14A
Test Laboratory: BEECH AIR	CRAFT Locat	ion: BOULDER,	COLORADO
Douglas Test Representative: K		•	4
Test Witness: 2. X Putt		£38\	
Douglas Q. C.		Customer	Q. C.
Internal Leakage Test Per Paragra	aph: 5.10.	Z Frank	EPEAT CYLL
Test Specimen No:	foliability (Columnical Columnical Columnica		
Test Start (Date, Time): 10-21	-66, 1415		
Test Completed (Date, Time): 10	-21-66, 2350	and all research	
Ambient Room Conditions:	Temperature °F	RH L	Atm. Press. In. Hg abs.
	<u> 70</u>	_25_	6/3.5 m
	66	<u> 28</u>	613.5 mm
Gate Seal		richpochthanisti kiliyanun mitanochtoochtkannen agannoonnide, nekstii kiedaalonooch	miljaigiste (maljosta netisamanund periorane insperioration perioration)
Test Parameter	Units	Required	Actual
Specimen Temperature	°F	Stabilized	-288
Inlet Pressure	psig	80 Maximum	80
Actuator Port Pressure	psig	475	475
Leakage Rate	scim	30	2.5
Time Maintained	minutes	5	5
Actuator			
Test Parameter	Units	Required	Actual
Actuator Port Pressure	psig	475	475
Specimen Temperature	°F	Ambient	55
Leakage Rate	sech	1.0	55 4.7×10 ⁻⁶ .
Maintained	minutes	5	5

Item Name: 102 Chilldow	n System Shutoff	' Valve	interference of the of the object of the
Part Number: 1A49965-521	han hidden fill fan de flyge steader fan de flyge mei steat fill fan de klaenster mûn de fan de flyge flyge fl		
Test Procedure Drawing No: 110	7783	Change Lette	r: <u>C</u>
Manufacturer's S/N: <u>Q20</u>	/ Test	Plan Line Item: FQ-	F-14A
Test Laboratory: BEECH AL			_
Douglas Test Representative:	K.G. TO610	ES Dat	e: <u>10-22-66</u>
Test Witness: Dougle	// ⁽² / ₆ s Q.C.	Custom	er Q.C.
Functional Test Per Paragraph:	5.11	Pest REDEAT C	YLLE TEST
Test Specimen No:	saarin sa dhaadhaa aa ah a		
Test Start (Date, Time): 10.	-22-66, 0:	300	
Test Completed (Date, Time): /			
Ambient Room Conditions:	Temperatur OF		Atm. Press. In. Hg abs.
	62	38	617 mm
Response Pime	destillation make un destillation destillati	man Planning and Long and Art	- Bartin Andrew The Angel Bartin
Test Farameter	Units	Required	Actual
Specimen Temperature	o _F	Stabilized	-292
Pressure (Inlet)	psig	80 max.	2.2
Flow	- Ethan	31 max.	N/A
Pressure (Actuator)	psig	47 5	475
Response Time	sec.	Clasina	0.050
	in/sec.	Caral	
Flow Scale N/A	gpm/inch		
0	psig/inch		
Time Base 500 encles /	seconds		
Accept:		Reject:	
Comment:			

wa 4 97 14 . h			FQ-F-14A
Position Indicator			
A. Temperature Stabilized_	-292	OPEN Indicator Light	ON ON
B. Outlet Fressure Zero	0	CLOSED Indicator Ligh	t ON ON
C. Actuator Pressure Zero	0	OPEN Indicator Light	ON ON
D. Temperature at Ambient_	62	OPEN Indicator Light	on on
Accept: X	ris artisaurinis sina manatauritan di	Reject:	
Comment:			
Dielectric Strength			
Test Parameter	Units	Required	Actual
Voltage	vac rms	1000	
Frequency	eps	60	
Rate of Application	volts/sec.	250 maximum	
Time	minutes	1	
Leekage Current	microamperes	200	
	e no di appagana natawa na a	Reject:	
Commercia THIS TEST	T WAS NO		AT THIS
Commercia THIS TEST	T WAS NO		AT THIS
Commercia THIS TEST TIME Insulation Resistance	T WAS NO	T PERFORMED	AT THIS
Commerce THIS TEST TIME Insulation Besistance Test Parameter	Units		
Comment THIS TEST TIME Insulation Resistance Test Parameter Voltage	Units	Required	Actual
Commercia THIS TEST TIME Insulation Resistance Pest Parameter Voltage Insulation Resistance	Units vdc megohms	Required 500	Actual 500
Commerce TAIS TEST TIME Insulation Resistance Test Parameter Voltage Insulation Resistance Secept:	Units vdc megolms	Required 500 100 minimum	Actual 500 > 100
Commercia TAIS TEST TAIS Insulation Resistance Voltage Insulation Resistance Sccept: Comments: ALL READ, No.	Units vdc megolms	Required 500 100 minimum Reject:	Actual 500 > 100
Commercia TAIS TEST TAIS Insulation Resistance Voltage Insulation Resistance Accept: Comments: ALL READ, No.	Units vdc megolms	Required 500 100 minimum Reject:	Actual 500 > 100
Accept: Commerc TAIS TEST TIME Insulation Resistance	Units vdc megolms	Required 500 100 minimum Reject:	Actual 500 > 100 100 magons

	5.19		em: FQ-F-14A
Continuity Check (Open Position	<u>,) </u>		
Test Parameter	Units	Required	Actual
Continuity	obms	0.25 maximum	A-B D-E G-H K-L
		March 18-18 March 18-18 Ann ann an Aire ann an Aire an	SEE COMMENT
No Continuity	megohms	20 minimum	B-C E-F H-J L-M
			SEE COMMENT
Accept:	northalaidh a gairleannaitheanaille s d	Reject:	
Comment: ALL PINS VV	ece less	THAN 0.25	OHMS.
ALL PINS WEA			•
	<u> </u>		(1990)(1111)3;
suggestermentante attendenten kon v. se si kuntuur ondre svertetendette doore. Her er ette svette viterte viterde sjerte	erferr van Marks – Man fondhov traskaudigestraskehinkenfentfinnifikanlen		ertinen til sentre er til sent til sentle sette er til sentre er til sentre er sentre er sentre er til sentre
Continuity Check (Closed Positi	ion)		
Test Position			
TOBO TOSTOTOTI	Units	Required	Actual
Continuity	Units ohms		Actual B-C E-F J-H L-M
and the state of t			
and the state of t			B-C E-F J-H L-M
Continuicy	ohms	0.25 maximum	B-C E-F J-H L-M SEF Comment
Continuity No Continuity	ohms megohms	0.25 maximum	B-C E-F J-H L-M SEE COMMENT A-B D-E G-H K-L
Continuity No Continuity Accept:	ohms megohms	0.25 maximum 20 minimum Reject:	B-C E-F J-H L-M SEE COMMENT A-B D-E G-H K-L SEE COMMENT
Continuity No Continuity	ohms megohms	0.25 maximum 20 minimum Reject:	B-C E-F J-H L-M SEE COMMENT A-B D-E G-H K-L SEE COMMENT

Item Name: LO ₂ Chille	lown System Shutoff Va	lve	THE POWER TO THE	
Part Number: 1A4996	5-521			
Test Procedure Drawing	No.: 1T07783	Change Le	etter: C	
Manufacturer's S/N:	0201	_ Test Plan Line	Item: FQ-F-14A	
Test Laboratory: Beech	n Aircraft	Location: Boul	lder, Colorado	
Douglas Test Representa	ative: <u>K. C. Tolid</u> e	es Dat	e <u>10-26-66</u>	
Test Witness:	Douglas Q.C.		stomer Q.C.	
Vibration Test Per Para	agraph: 5.15	MAN Tips designation of Fig. 100		
Test Specimen No.:	1	ndar displayments and many employments have a proper deserving		
		Sine	Random	
Test Start (Date, Time)	10-26-60	6, @ 0.530,0-2	7.60 @ 0245	
Test Completed (Date, 7	Time): 10.26-6	6, @ 0600 10-2	7-66, @ 0320	
Ambient Room Conditions	Temp	perature RH	Atm. Press. In Hg Abs.	
	-	74 22	620 mm	
Sinusoidal Sweep Test		Axis Orie	entation: THRUST A	
	Sweep Rate Octave/Minute	Frequency cps	Amplitude	
Required	1.0	5 to 24	0.032 In. D.A.	
Actual	NOTE: Sweep Rates Approx.	5 70 24	0.032 M. D.A.	
Required	1.0 Oct/Min.	24 to 47	1.0 G Peak	
Actual		24 7047	1.0 G PEAK	
Required		47 to 200	0.0088 In. D.A.	
Actual		47 70 200	0.0088 N.D.A.	
Required	Total Run Time	200 to 2000	17.5 G Peak	
Actual	21 Min. 04 Sec.	200 70 2000	17.5 G. PEAK	

Sheet Of

Vibration Test Per Para	graph: 5.	15	Test Plan Li	ne Item:	FQ-F-14A
Axis Orientation:	HRUST "A"		P/N: <u>1A4996</u>	5-521	ingen tertem versioning generalistic mentagen er en begreve en begreve en betre betre betre betre betre betre
Random Vibration Tes	t Specimen No.:	1 S/1	N: 02	2 <u>01</u> Dat	re: <u>/0-26-66</u>
	Time A	applied es)	Frequency cps	Amı	olitude
Required]	.2	20 to 60	60 0.01G ² /cps	
Actual	/	2			*
Required	1	.2	60 to 120	+10dl	0/0ctave
Actual		12	*		*
Required]	.2	120 to 2000	0.10	G ² /cps
Actual		'2	* *		
Accept:	X	Reje c t:			
Comment:					rei arlanden. Mit _{es} era gestjora givint klander, de Olivina mangasa och Periode vika (de Vi
* See Attached Plots					in the state of th
Mechanical Shock Test P	er Paragraph:	5.16			3 °
Test Start (Date, Time)	:	27-66,	@ <u>0700</u>		
Test Completed (Date, T					
Test Parameter		Units	Requ	uired	Actual
Amplitude (1/2 Sine P	ulse)	G	20 1	Peak	20 PEAK
Time		millise	conds 10(-	<u>-</u> 2)	10 (±2)
Amplitude (1/2 Sine P	ulse)	G	20 1	Peak	ZO PEAK
Tíme	,	millise	conds 10(-2)	10 (±2)
Amplitude (1/2 Sine P	ulse)	G	20 1	Peak	20 PEAK
Time		millise	conds 10(-2)	10 (± 2)

PAGE NO. ____

DOUGLAS AIRCRAFT COMPANY , INC.

SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)

CONFIGURATION ---S/N 0201 TEST CONDITIONS NOTE ... SEE PAGE _ TEST DATE..... 10/25/66 FOR PICK UP LOCATION AXIS OF EXCITATION.... THRUST LEGEND ... PICK UP NUMBER (1) ... 1 FILTERED UPSWEEP ----PICK UP RESPONSE..... THRUST DOWNSWEEP -----INPUT ACCEL.PER PAGE.. 1000.0 100.0 ഗ G Z ACCELERATION 1.0 0.1 1000. 10.

PAGE NO. ___

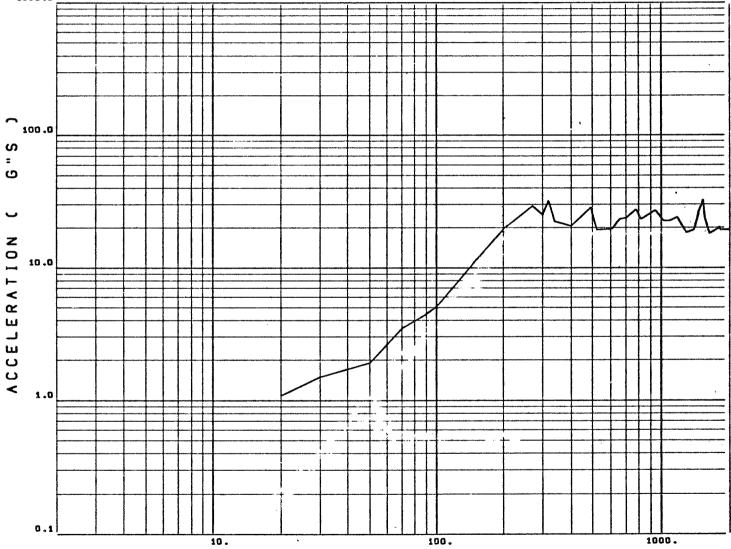
DOUGLAS AIRCRAFT COMPANY , INC.

SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)

CONFIGURATION ---S/N 0201 NOTE ... SEE PAGE TEST CONDITIONS.... FOR PICK UP LOCATION TEST DATE..... 10/25/66 AXIS OF EXCITATION.... THRUST PICK UP NUMBER (1) ... 1 FILTERED LEGEND ... UPSWEEP -PICK UP RESPONSE THRUST DOWNSWEEP -----INPUT ACCEL.PER PAGE.. 1000.0 0.001 ഗ ග Z ELERATIO 10.0 ပ 1.0 1000.

SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)

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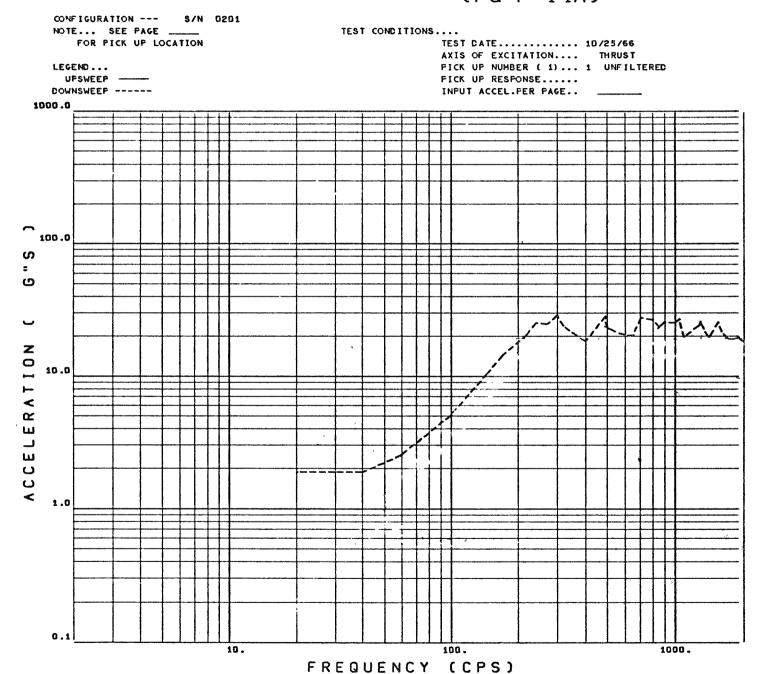


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DOUGLAS AIRCRAFT COMPANY , INC.

SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)

EP REPORT NO. ______



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REPORT NO. ___

DOUGLAS AIRCRAFT COMPANY , INC.

SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)

CONFIGURATION --- S/N 0201 NOTE ... SEE PAGE . TEST CONDITIONS.... FOR PICK UP LOCATION TEST DATE..... 10/25/66 AXIS OF EXCITATION.... THRUST PICK UP NUMBER (2) ... 2 FILTERED LEGEND ... UPSWEEP -PICK UP RESPONSE..... THRUST COWNSWEEP -----INPUT ACCEL.PER PAGE.. 1000.0 100.0 S RATION 10.0 w س س ACCE 1.0

SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)

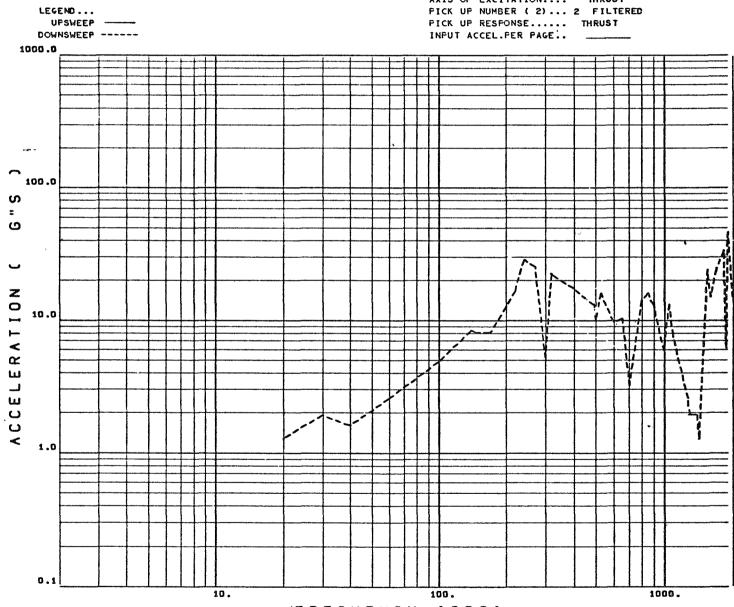
FAGE NO. ___ REPORT NO. __

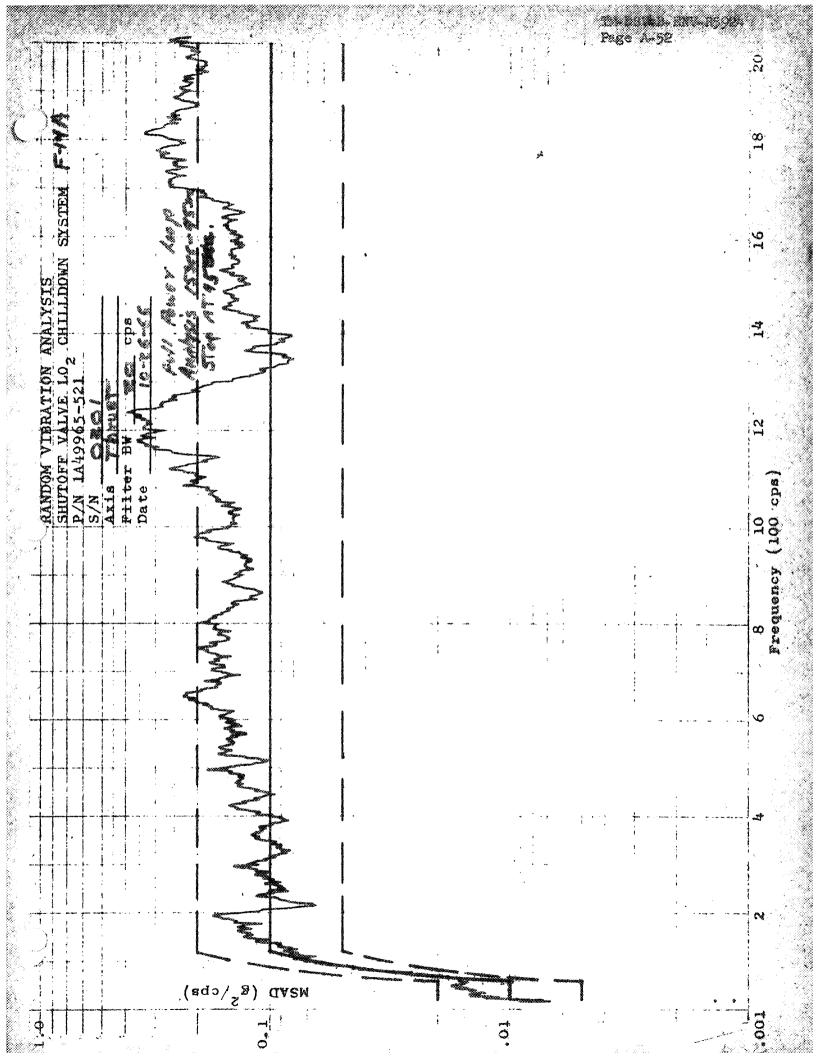
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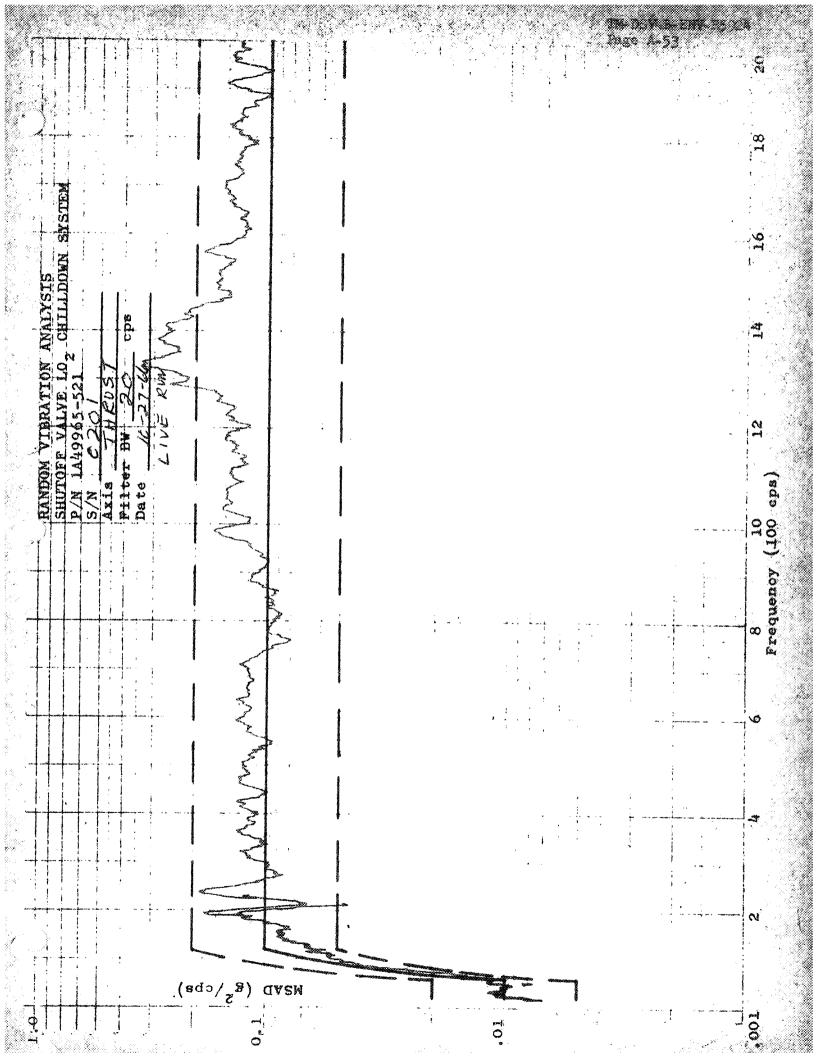
CONFIGURATION ---S/N 0201 NOTE ... SEE PAGE . FOR PICK UP LOCATION

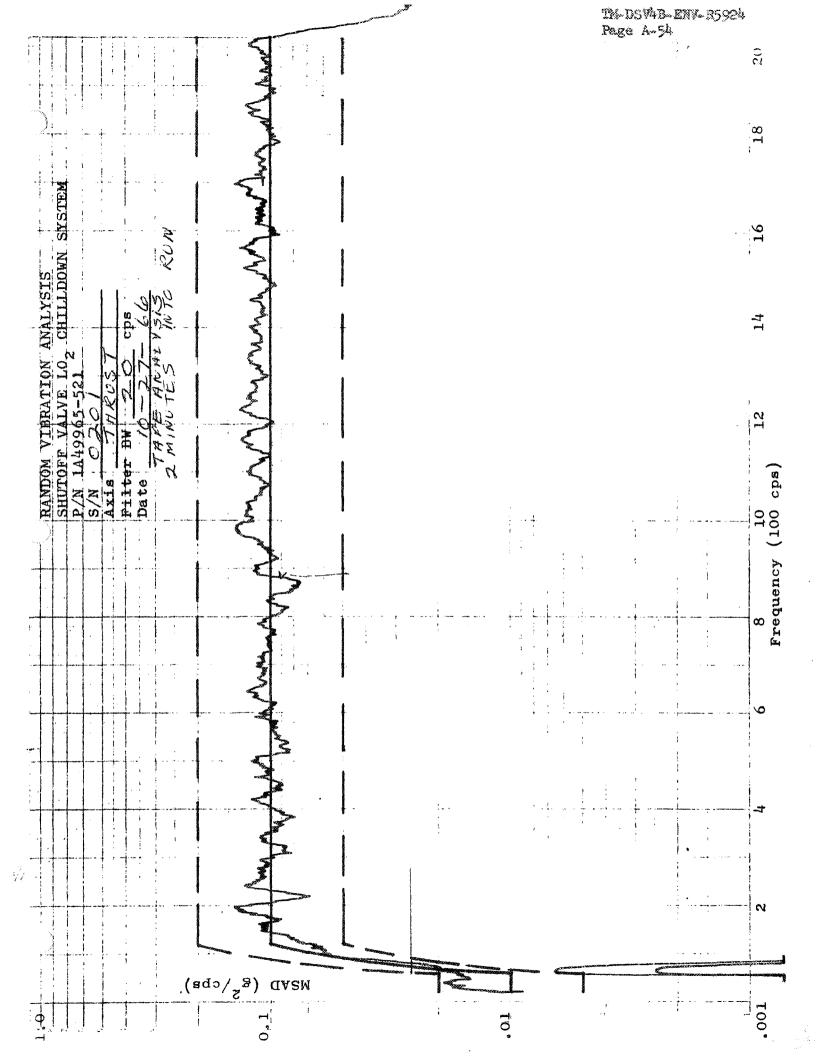
TEST CONDITIONS

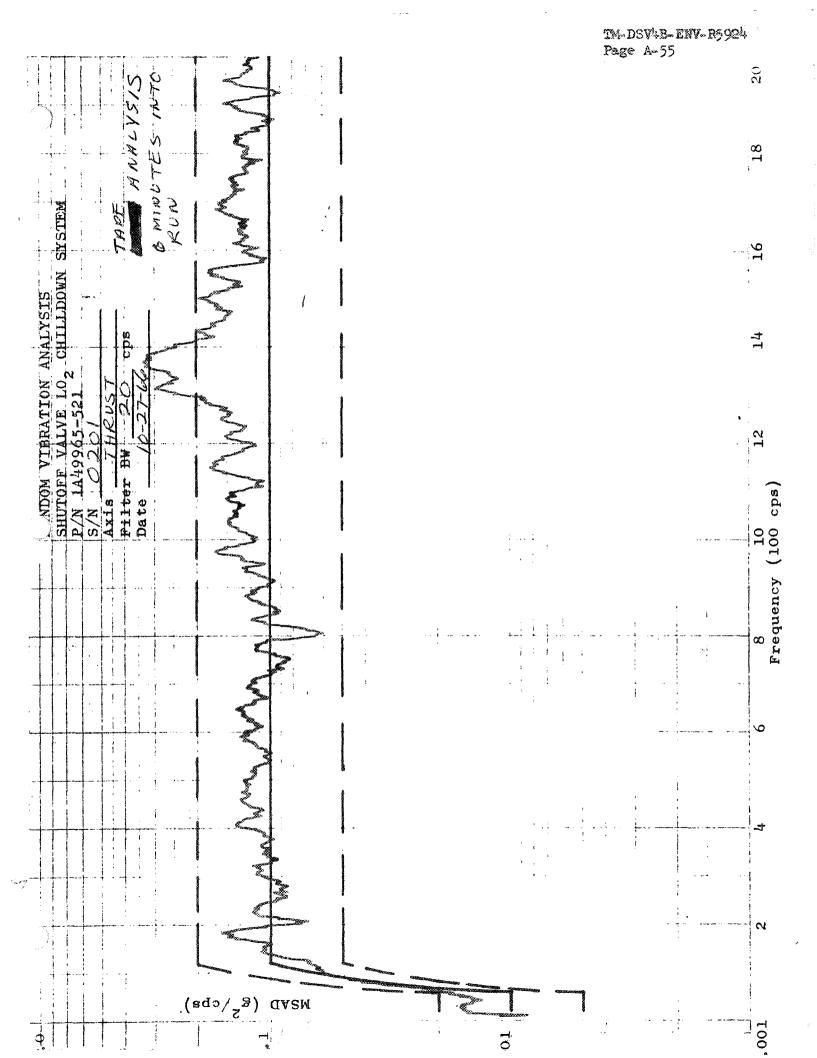
TEST DATE..... 10/25/66 AXIS OF EXCITATION.... THRUST



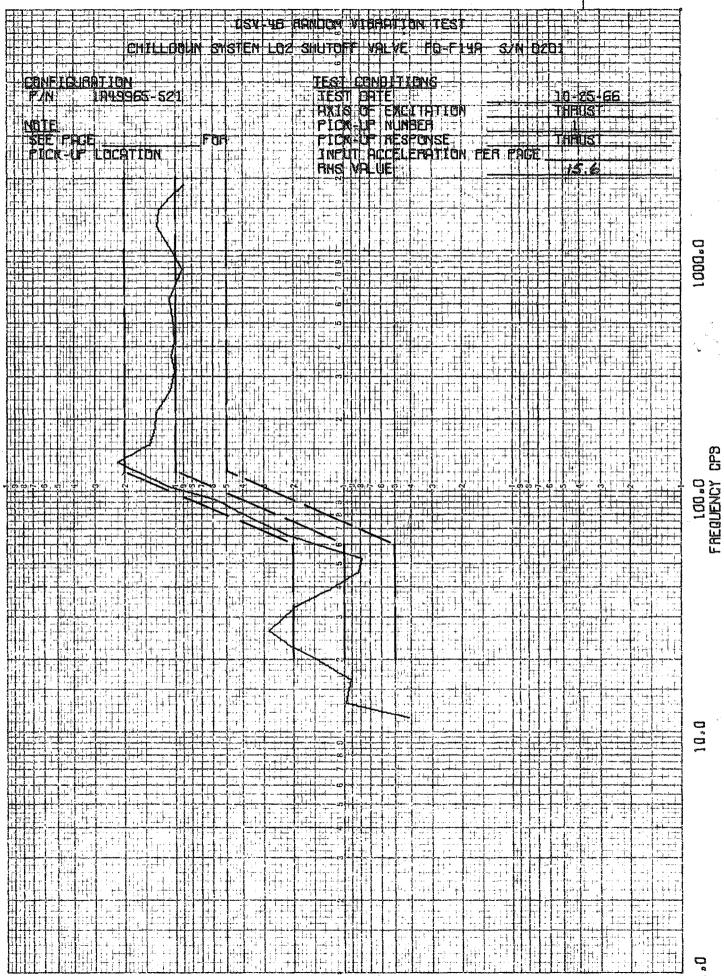








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FORM 25-5-1 (REV. 8-53)

CHECKED BY:___

TITLE CHILLDOWN SHUTOFF VALVE TEST (F-1:A)

DATE: 10-29-66

PREPARED BY. W. SLACK DOUGLAS AIRCRAFT COMPANY, INC.

MISSILE & SPACE SYSTEMS DIVISION

TW-DSV4B-ENV-R5924 Page A-57 PAGE: A-57

MODEL DSV-4B REPORT NO : R5924

SHOCK PULSE A AXIS

5769-6404 27903 1T07782

NOTE:

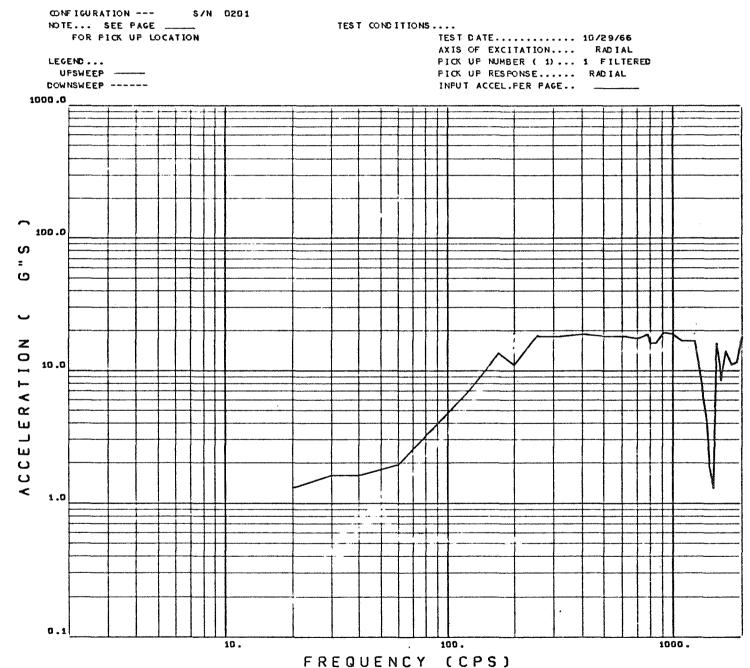
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Item Name: LO ₂ Chille	lown System Shuto	ff Valve	and the same of th		
Part Number: 1A49965	5-521				
Test Procedure Drawing	No.: 1T07783	and a finite state of the state	Change Le	etter: C	
Manufacturer's S/N:	0201	Test	Plan Line	Item: FQ-F-14A	
Test Laboratory: Beech	n Aircraft	Loca	tion: <u>Bou</u>	lder, Colorado	
Douglas Test Representa	tive: K.C.	Tolides	Dat	te <u>/0-28-66</u>	
Test Witness:	Douglas Q.C.		<u> </u>	stomer Q.C.	
			Cus	stomer Q.C.	
Vibration Test Per Para					
Test Specimen No.:				ventalusen paakoon katta opaan 19200 diikka oo C. Askalikkii Makka 2014 oo ka ka 1920 da 1920 da 1920 da 1920 d	
Test Start (Date, Time)		Sine 0-2 8-66 [@]	0300 10.2	Random 9-46 [©] 0430	
Test Completed (Date, 7	}-			9-66 @ 0500	
Ambient Room Conditions: Temperature RH Atm. Press. OF % In Hg Abs.					
		70	44	628 mm	
Sinusoidal Sweep Test		AUGUSTANIA MINISTERIA MARIANTANIA	Axis Orio	entation: Rabias 3	
		7		all the second s	
	Sweep Rate Octave/Minut		equency cps	Amplitude	
Required	1.0	5 t	:0 24	0.032 In. D.A.	
Actual	NOTE: Sweep Rates Approx	. 5	TO 24	0.032 In.D.A.	
Required	1.0 Oct/Min.		to 47	1.0 G Peak	
Actual		24	7647	1.0 G PEAK	
Required		47	to 200	0.0088 In. D.A.	
Actual		47	70 200	0.0088 LN.D.A.	
Required	Total Run Ti	me 200) to 2000	17.5 G Peak	
Actual	<u>17 Min.55</u>	Sec. 200	To 2000	17.56 PENK	

Sheet ___ Of ___

Vibration Test Per Paragraph:	5.15	Test Plan Lin	e Item: FQ	- F - 14 A	
Axis Orientation:		P/N: <u>1A49965</u>	-521		
Random Vibration Test Specime	n No.: 1	S/N: 02	Ol Date:	10-29-66	
	Time Applied (Minutes)	Frequency cps	Amplitu	ide	
Required	12	20 to 60	to 60 0.01G ² /cps		
Actual	12	*	*	*** (AMMERICA) (Company and in a company and an artist of Committee Company (Committee Committee)	
Required	12	60 to 120	+10db/0ct	ave	
Actual	12	*	*	Circulation disc ensed and proposed and proposed and a service of the service of	
Required	12	120 to 2000	0.1G ² /c _l)S	
Actual	12	*	*	*	
Accept: X	Reject:				
Comment:				Marie (1964) og ganging kalangan pangan di belaga pangan kalang menandi kalang belaga sa	
* See Attached Plots			andres C Calmatana and San Andres (1 to 6 process and sound to the second sound to the	ider versich. I der eine gestellt von der eine d Auf der eine der ein	
Mechanical Shock Test Per Paragr	aph: <u>5.16</u>	-			
Test Start (Date, Time):	10-29-66	, @ <u>053</u>	0	October Transcott Brownia White Court	
Test Completed (Date, Time):	10-29-66	, @ <u>// 4</u>	5	ANN and the Assert state and Assert proposed with	
Test Parameter	Units	Requi	ired Ac	tual	
Amplitude (1/2 Sine Pulse)	G	20 Pe	eak · 20	PEAK	
Time	millis	seconds 10(±2	2) /0	(£2)	
Amplitude (1/2 Sine Pulse)	G	20 Pe	eak 2	O PEAK	
Time	millis	seconds 10(±2	2) /4	(t2)	
Amplitude (1/2 Sine Pulse)	G	20 Pe	eak 2	o Perk	
Time	millis	seconds 10(±2	2) /	o (t :,)	

PAGE NO. _____ SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)



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PAGE NO. ___

REPORT NO.

DOUGLAS AIRCRAFT COMPANY , INC.

SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)

ONFIGURATION ---S/N 0201 NOTE ... SEE PAGE _ TEST CONDITIONS FOR PICK UP LOCATION TEST DATE..... 10/29/66 AXIS OF EXCITATION.... RADIAL LEGEND ... PICK UP NUMBER (1) ... 1 FILTERED UPSWEEP ----PICK UP RESPONSE..... RADIAL DOWNSWEEP -----INPUT ACCEL.PER PAGE.. 1000.0 0.001 S 9 ACCELERATION 10.0 1.0 1000. FREQUENCY (CPS)

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PAGE NO. __

REPORT NO. ___

DOUGLAS AIRCRAFT COMPANY , INC.

SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE

(FQ F-14A)

CONFIGURATION ---S/N 0201 NOTE ... SEE PAGE TEST CONDITIONS FOR PICK UP LOCATION TEST DATE..... 10/29/66 AXIS OF EXCITATION.... RADIAL PICK UF NUMBER (1) ... 1 UNFILTERED LEGEND ... UPSWEEP ----FICK UP RESPONSE..... RAD'IAL COWNSWEEP -----INPUT ACCEL.PER PAGE.. 1000.0 100.0 S ပ Z ACCELERATIO 10.0 1.0 1000.

FREQUENCY (CPS)

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PAGE NO. _

REPORT NO. ___

DOUGLAS AIRCRAFT COMPANY , INC.

SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)

S/N 0201 CONFIGURATION ---NOTE ... SEE PAGE _ TEST CONDITIONS FOR PICK UP LOCATION TEST DATE..... 10/29/66 AXIS OF EXCITATION.... RADIAL LEGEND ... PICK UP NUMBER (1) ... 1 UNFILTERED PICK UP RESPONSE RADIAL UPSWEEP --DOWNSWEEP -----INPUT ACCEL.PER PAGE.. 1000.0 100.0 S ഥ CELERATION 0.01 ပ S V 1.0 10. 100. 1000 .

PAGE NO. ___

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DOUGLAS AIRCRAFT COMPANY , INC.

REPORT NO. SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTCFF VALVE (FQ F-14A)

ONFIGURATION ---S/N 0201 TEST CONDITIONS NOTE ... SEE PAGE _ FOR PICK UP LOCATION TEST DATE..... 10/29/66 AXIS OF EXCITATION.... RADIAL LEGEND ... PICK UP NUMBER (2) ... 2 FILTERED UPSWEEP ---FICK UP RESPONSE..... RADIAL DOWNSWEEP -----INFUT ACCEL.PER PAGE.. 1000.0 100.0 ഗ ပ ACCELERATION o.o. 1.0

FREQUENCY (CPS)

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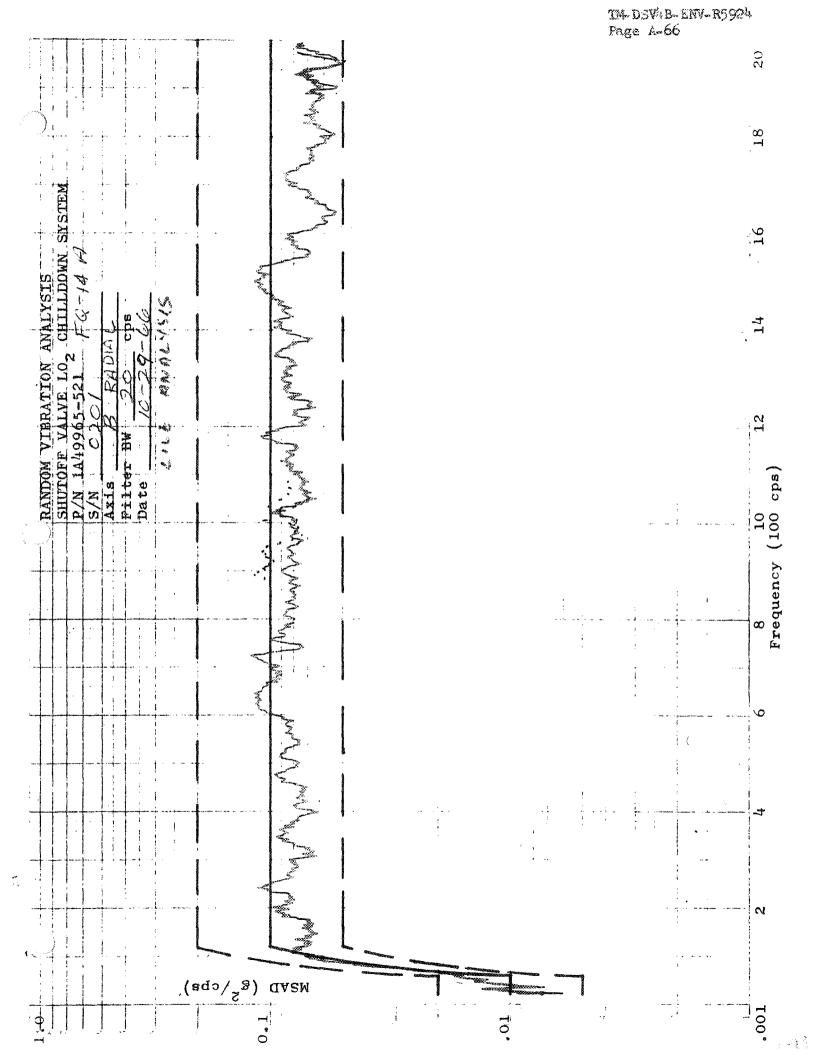
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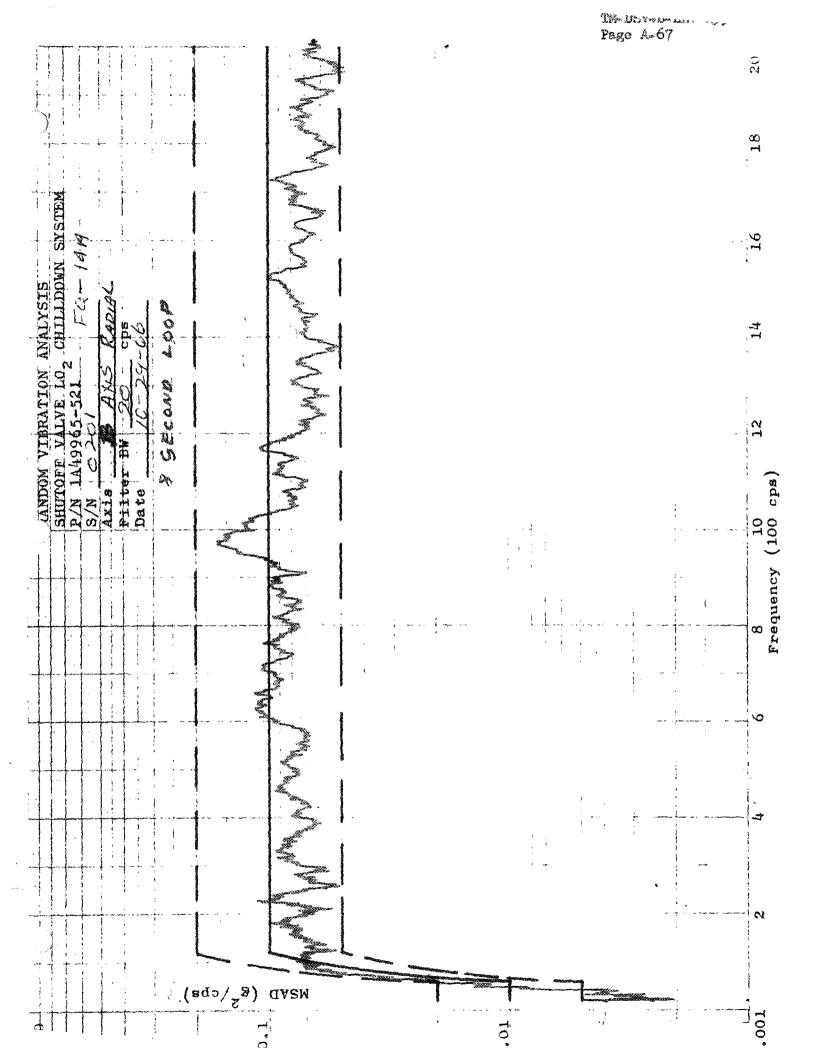
REPORT NO.

DOUGLAS AIRCRAFT COMPANY , INC.

SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)

CONFIGURATION ---S/N 0201 NOTE ... SEE PAGE TEST CONDITIONS FOR PICK UP LOCATION TEST DATE..... 10/29/66 AXIS OF EXCITATION RADIAL PICK UP NUMBER (2) ... 2 FILTERED LEGEND ... UPSWEEP -PICK UP RESPONSE RADIAL DOWNSWEEP -----INPUT ACCEL.PER PAGE.. 1000.0 100.0 S ပ Z ELERATIO 10.0 ပ 1.0 100. 1000 .





5 100.0 FREQUENCY

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FORM (REV.	
FORM	25-5-1
(REV.	8-53)

PREPARED	BY:	W.	SLACK	

CHECKED RY:_

DATE: 10-29-66

TITLE: CHILLDOWN SHUTOFF VALVE TEST (F-14A)

MISSILE & SPACE SYSTEMS

DIVISION

Page A.60

PAGE:

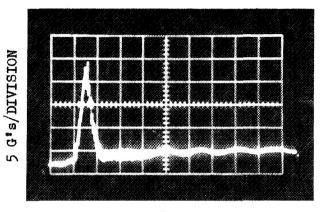
MODEL: DSV-4B

REPORT NO .: _

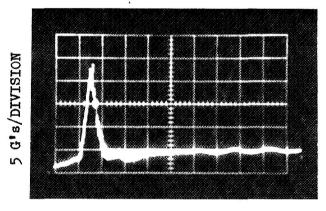
SHOCK PULSE B AXIS

DOUGLAS AIRCRAFT COMPANY, INC.

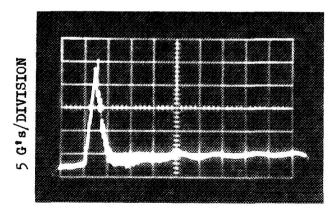
5769-6404 27903 1**1**07782



10 MSEC/DIVISION



10 MSEC/DIVISION



10 MSEC/DIVISION

Item Name: LO2 CHIIIC	lown System Shut	.ULL Val	VE				************************	######################################
Part Number: 1A49965	5-521							Electric part
Test Procedure Drawing	No.: 1T07783) .	*****************	Chang	ge Lette	r: _	С	
Manufacturer's S/N:	0201		Test	Plan I	Line Ite	m:	FQ-F-14	<u>A</u>
Test Laboratory: <u>Beech</u>	Aircraft	da na ina anta anta anta anta anta anta a	Loca	tion:	Boulder	, Col	orado	-
Douglas Test Representa	itive: K.C.	Tolide	s		Date _	10 -	29-66	2
Test Witness:	7 Piret	·			<u> </u>			UZ ajad Mandari (Santa Alba - Alba
	Douglas Q.C.				Custon	er Q.	.C	
Vibration Test Per Para)	***************************************					
Test Specimen No.:	1		The same was the same one	-				
			Sine			ndom		Ĭ
Test Start (Date, Time)	•	10-29-64	, @	1730	16-29-66	@	1950	ļ
Test Completed (Date, T	ime):	10-29-66	, @	1815	10.29-66,	@	2030	1
Ambient Room Conditions	:	· · · · · · ·	eratu o F	re	RH %		Press. Ig Abs.	
			<u>70 </u>		44	62	8 mm	
Sinusoidal Sweep Test				Axis	Orienta	tion:	TANG	<u>. 'c</u>
	Sweep Rate Octave/Minu	ıte		quency cps		Ampli	tude .	
Required	1.0		5 t	o 24		0.032	In. D.A	. •
Actual	NOTE: Swee	x.	5	70 24		0.03	12 M. D.	Α·
Required	1.0 Oct/Min	l o	24	to 47		1.0	G Peak	·
Actual			24	- TO 47		1.0	G PEAK	
Required			47	to 200		0.008	88 In. D.	Α.
Actual			47	TO 200	,	0.00	88 In. d.	A.
Required	Total Run T	ime	200	to 200	00	17.5	G Peak	e comme constructive Colst
Actual	<u> 17 Min. 34</u>	Sec.	200	To 20	00	17.5	G PEAK	

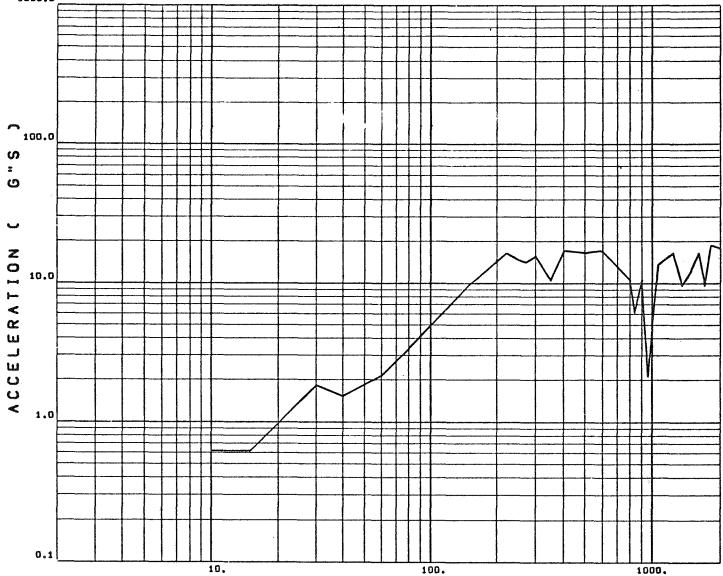
Sheet ___ Of ___

Vibration Test Per Paragraph:	5.15	Test Plan Lin	e Item:	FQ-F-14A	
Axis Orientation: TANGEN	ITIAL "C"	P/N: <u>1A49965</u>	-521		
Random Vibration Test Specime	en No.: 1 S	/N: 020	Ol Dat	e: <u>/0-29-6</u>	
	Time Applied (Minutes)	Frequency cps	Amp	litude	
Required	12)1G ² /cps	
Actual	12	*		*	
Required	12	60 to 120	+10db	/Octave	
Actual	12	*		*	
Required	12	120 to 2000	0.10	G ² /cps	
Actual	12	*	The country was principles to the control of the co	*	
Accept: X	Reject:			enterment it den geste statistische Charles ander eine gesche den gesche vertrieben von des gesche segeliebe	
Comment:					
	POSTOLOGICA AND METO AND METO CONTROL				
* See Attached Plots				nementensk en statement statemen <u>t s</u> en vende Cond-Transchap (system) system se system	
Mechanical Shock Test Per Paragi	Taph: 5.16				
Test Start (Date, Time):	10-29-66,	@ 2/00	•		
Test Completed (Date, Time):	10-29-66,	@ <u>2/30</u>		namenti (20) 4 milare pakin indoninana pakeo akaban-	
Test Parameter	Units	Requi	red	Actual	
Amplitude (1/2 Sine Pulse)	G	20 Pe	ak	20 PEAK	
Time	millise	conds 10(+2	2)	10 († 2)	
Amplitude (1/2 Sine Pulse)	G	. 20 Pe	ak	20 PEAK	
Time	millise	conds 10(±2	2)	10 (±2)	
Amplitude (1/2 Sine Pulse)	G	20 Pe	ak	20 PEAK	
Time	millise	conds 10(±2	2)	10 (±2)	

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DOUGLAS AIRCRAFT COMPANY , INC.

SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)



PAGE NO. __

DOUGLAS AIRCRAFT COMPANY , INC.

SINUSOIDAL FREQUENCY SWEEP REFORT NO. SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)

CONFIGURATION ---S/N G201 NOTE ... SEE PAGE TEST CONDITIONS TEST DATE..... 10/29/66 FOR FICK UP LOCATION AXIS OF EXCITATION.... TANGENTIAL LEGEND ... FICK UP NUMBER (1) ... 1 FILTERED UPSWEEP -FICK UP RESPONSE..... TANGENTIAL DOWNSWEEP -----INPUT ACCEL.PER PAGE.. 1000.0 100.0 ഗ G RATION 10.0 E E ပ 1.0 0.1 1000. 10. 100.

SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)

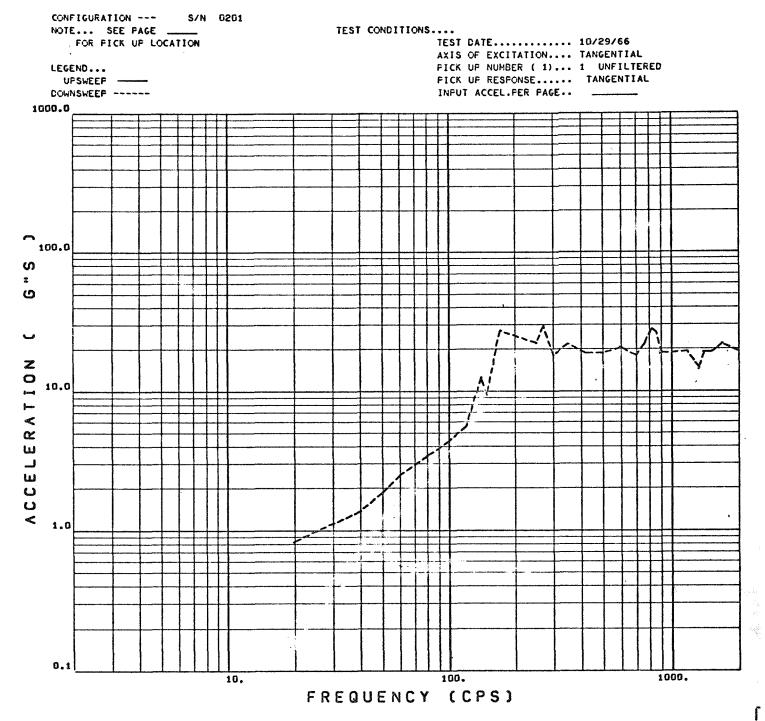
CONFIGURATION --- S/N G2G1 NOTE ... SEE FAGE . TEST CONDITIONS.... FOR FICK UP LOCATION TEST DATE..... 10/29/66 AXIS OF EXCITATION.... TANGENTIAL LEGEND... FICK UP NUMBER (1) ... 1 UNFILTERED UPSWEEP -FICK UP RESPONSE..... TANGENTIAL DOWNSWEEP -----INPUT ACCEL.PER PAGE.. 1000.0 100.0 S G Z NCCELERATION 5 1.0 10. 1000. FREQUENCY (CPS)

PAGE NO. __

REPORT NO. ___

DOUGLAS AIRCRAFT COMPANY , INC.

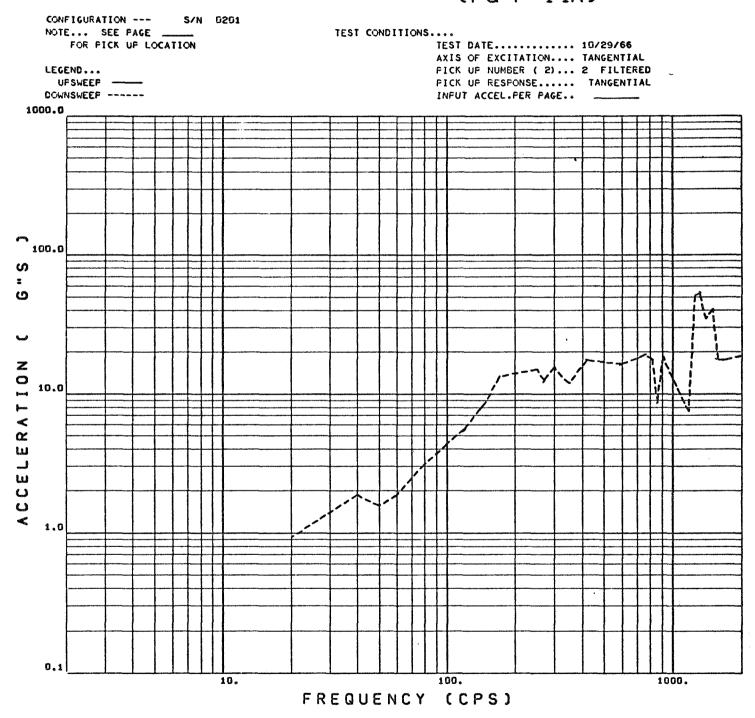
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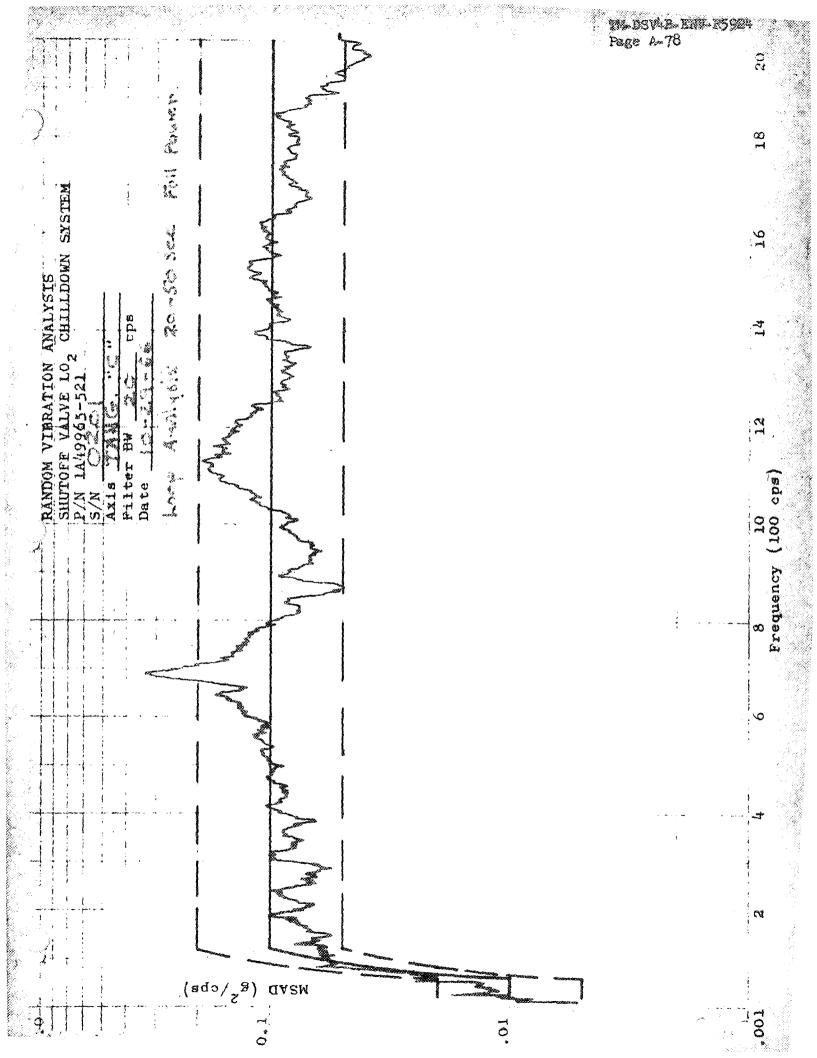


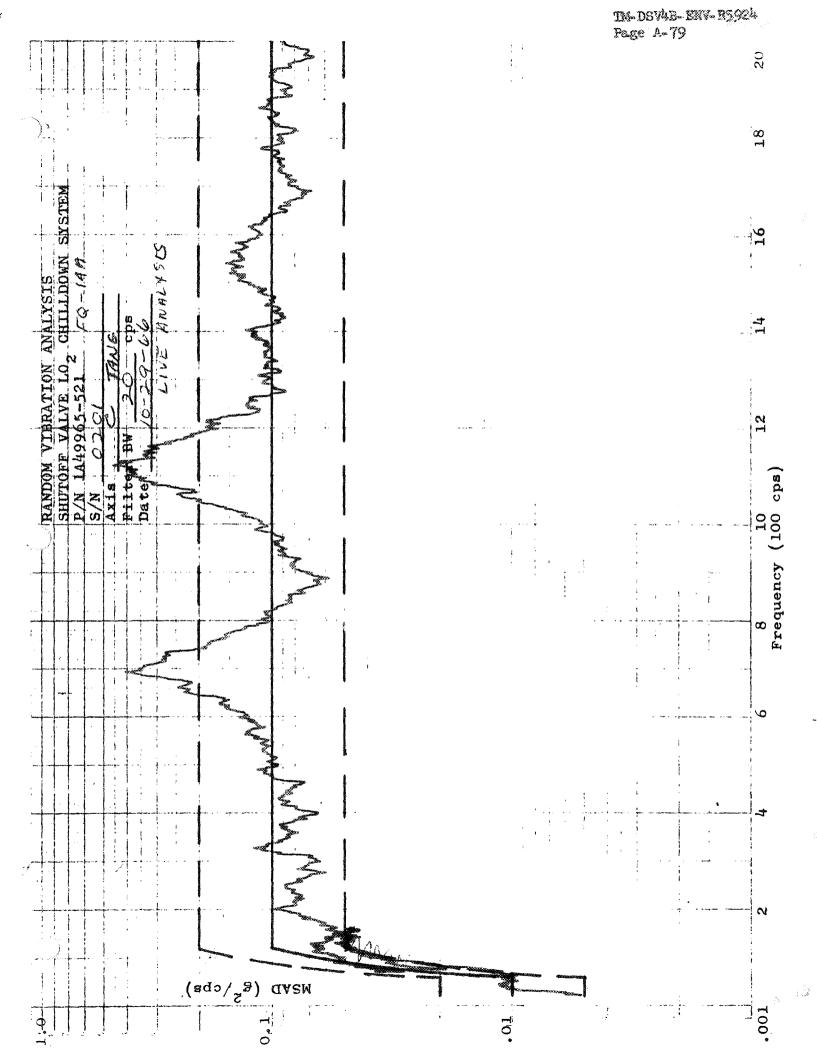
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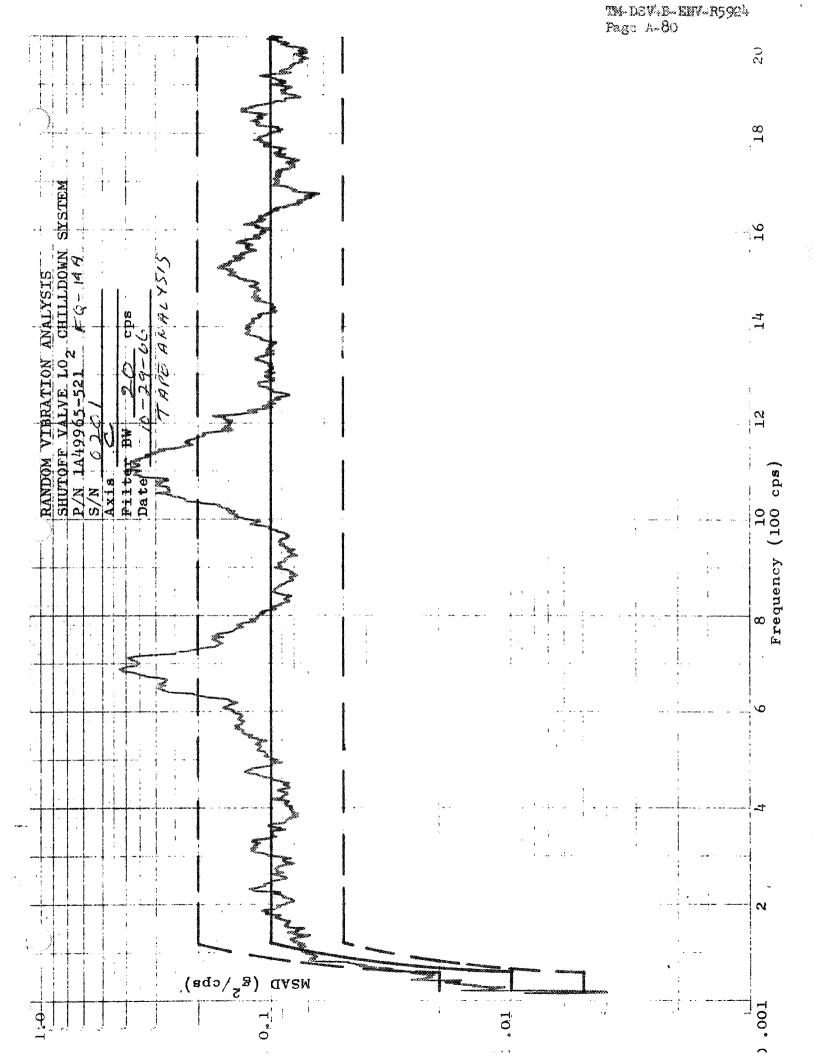
S/N 0201 CONFIGURATION ---NOTE ... SEE PAGE . TEST CONDITIONS FOR PICK UP LOCATION TEST DATE..... 10/29/66 AXIS OF EXCITATION.... TANGENTIAL LEGEND ... PICK UP NUMBER (2) ... 2 FILTERED UPSWEEP ----PICK UP RESPONSE..... TANGENTIAL INPUT ACCEL.PER PAGE.. DOWNSWEEP -----1000.0 100.0 ഗ ഥ Z ACCELERATION 0.1 1.0 1000. 10. FREQUENCY (CPS)

SINUSOIDAL FREQUENCY SWEEP SIV-B CHILLDOWN SHUTOFF VALVE (FQ F-14A)









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FORM	25-5-1
(REV.	8-53)

PREPARED BY: W. SLACK

CHECKED BY:_

DOUGLAS AIRCRAFT COMPANY, INC.

MISSILE & SPACE SYSTEMS DIVISION DATE: 10-29-66 MISSILE & SPAN
TITLE: CHILLDOWN SHUTOFF VALVE TEST (F-14A)

PAGE:____ MODEL: DSV-4B

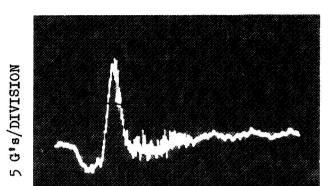
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REPORT NO .: _

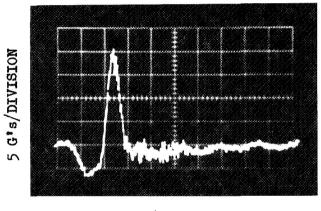
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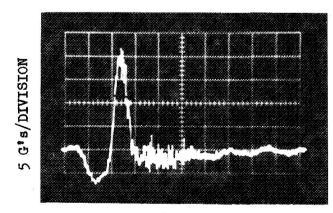
SHOCK PULSE C AXIS



10 MSEC/DIVISION



10 MSEC/DIVISION



10 MSEC/DIVISION

Item Name: LO2 Chille	lown System Shutor	I valve		
Part Number: 1A4996	5-521			
Test Procedure Drawing	No.: 1T07783	Chang	ge Letter:	C
Manufacturer's S/N:	0201	Test Plan 1	Line Item:	FQ-F-14A
Test Laboratory: Beecl	n Aircraft	Location:	Boulder, C	olorado '
Douglas Test Representa	ative: K.C.T	olides	Date/0	1-29-66
Test Witness: 1	1331			
	Douglas Q.C.		Customer	Q.C.
Vibration Test Per Para	agraph: <u>5.15</u>	order (* marchanistic CAV (SAPA) (* austruppe berrunt 2 v / 1994)		
Test Specimen No.:	1	and if they are all constrained and of the September of the paper, require paper and the		
		Sine	Rando	m
Test Start (Date, Time)):	29-66, [@] 2230	, @	N/A
Test Completed (Date, 7	Time):	19-66, @ 2300	, @	N/A
Ambient Room Conditions	6 .	Temperature or		m. Press. Hg Abs.
		66	<u>36</u>	21 mm
RE-RUN OF 5 TO 18 & Sinusoidal Sweep Test	PS PORTION ON		Orientatio	n: THRUST "A
	Sweep Rate Octave/Minute	Frequency cps	Amp	litude
Required	1.0	5 to 24 /	0.0	32 In. D.A.
Actual	NOTE: Sweep Rates Approx.	5 70 18	0.0	32 In.D.A.
Required	1.0 Oct/Min.	24 to 47	1.0	G Peak
Actual		N/A		N /A
Required		47 to 200	0.0	088 In. D.A.
Actual		N/A	^	1/19
Required	Total Run Tim	e 200 to 200	00 , 17.	5 G Peak
Actual	_/_Min. <u>50</u> S	ec. N/A	/	v //
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Sheet ___ Of ___

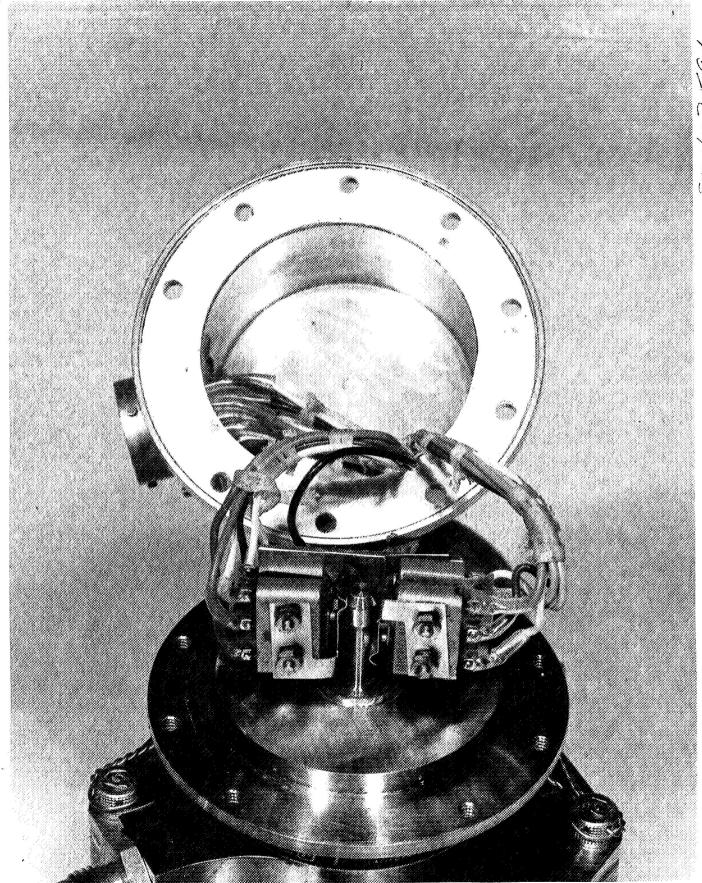
Item Name: Log Chilldown S	ystem Shutoff Valve	erne a Alter Plane Plane I de la contacte de la collège de Plane I de la collège de la collège de la collège d	
Part Number: 1A49965-521	andra alla alla deritti, taariississississa, ilka kitalajaalisisti, sakasa liisa sakasa kitala sakasa kitala s		
Test Procedure Drawing No: _	1107783	Change Letter	: <u>C</u>
Manufacturer's S/N:	O/ Test Pla	n Line Item: <u>FQ-1</u>	P-14A
Test Laboratory: BEECH A	IRCHAFT Location	BOULDER, C	OLORADO
Douglas Test Representative:	K.C. TOLIDE	S Date:	10-30-66
Test Witness:	as Q.C.	Customer	0.0
Proof Pressure Test Per Para	•		•
Test Specimen No:	on the contract transition used to the Contract transition and transition	recuirem metalletaren perminden perminden perminden perminden perminden perminden perminden perminden perminden	at Control of the Con
Test Start (Date, Time):	-30-66, 1700		
Test Completed (Date, Time):	*		
Ambient Room Conditions:			Adm. Decas
Midlett Room Conditions:	Temperature F	RH %	Atm. Press. In. Hg abs.
	65	35	623 m
Valve 8käy			
Test Faram ter	Units	Required	Actual
Temperature	$\circ_{\mathbf{F}}$	-300 (<u>+</u> 20)	-300
Pressure	psig	190	190
Time	minutes	5	\$
Actuator	or to the grant the employment on any throughout the employment and property of the contract o		
Test Parameter	Units	Requi re d	Actual
Temperature	o _k	Ambient	65
Pressure	psig	7 50	750
Time	minutes		45
Accept:		Reject:	
Comments:			
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Item Name: LO2 Chilldown	System Shutoff V	alve	nekaten film genikken over mingelim over fra tet in med slagen en bligt hjelge
Part Number: 1A49965-521	enners entere en protecte en entere en de transporte en entere protecte en entere protecte en entere en entere		ntilly and the same of the sam
Test Procedure Drawing No: 1TO	7783	Change Letter:	and Ephrysgon-nig Miclinus labels, majoriti Paylaka katiliga (1800)
Manufacturer's S/N: 020	Test P.	lan Line Item: FQ	F-14A
Test Laboratory: BEECH AIRC	RAFT Location	on: BOULDER,	COLORADO
Douglas Test Representative: K	C. TOLIDES	Date: /6	0-30-66
Test Witness: A. L. Pouglas Q.	Tigo	6.7B	
2046240 4	•	Ous comer 4	
External Leakage Test Per Paragr	aph: 5.10.1	POST VIBRAT	ION AND SHOK
Test Specimen No:			
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Test Completed (Date, Time): 10-	• •	- Marketon	
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External Leakage			
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Leakage Rate	sech	1.0	1.6 ×10-4
Inlet Pressure	psig	125 Maximum	/25
Time Maintained	Minutes	5	5
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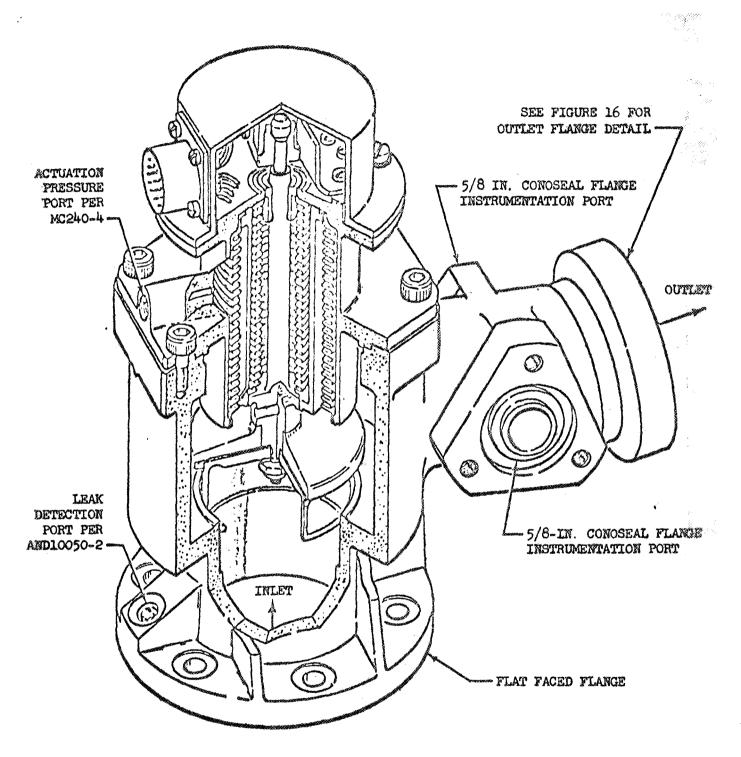
Item Name: LO2 Chilldown (System Shutoff Va	lve	
Part Number: 1A49965-521			
Test Procedure Drawing No: 1	r07783	Change Let	ter: C
Manufacturer's S/N: O201	Test	Plan Line Item:	FQ-F-14A
Test Laboratory: BEECH AIR	CRAFT Locat	ion: BOULDE	e, COLORAD
Douglas Test Representative: K		Date:	10-30-66
Test Witness: H. W. Douglas Q. C.		Customer	nyunomination pareen base pareen automorphis per entre circum
•			
Internal Leakage Test Per Paragra	iph: 5,/0.		<u>Vibration</u> and Sheck
Test Specimen No:/	PSS AND THE CONTRACT OF THE CO	<i>^</i>	ind shock
Test Start (Date, Time): 10-30	-66, 1940		
Test Completed (Date, Time): 10-	30-66, 200	20 Literature constant	
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Gate Seal	-		
Test Parameter	Units	Required	Actual
Specimen Temperature	°F	Stabilized	N/A
Inlet Pressure	psig	80 Maximum	N/A
Actuator Port Pressure	psig	475	N/A
Leakage Rate	scim	30	N/A
Time Maintained	minutes	5	NA
Actuator			Section Section (Control of Control of Contr
Test Parameter	Units	Required	Actual
Actuator Port Pressure	psig	475	475
Specimen Temperature	°F	Ambient	60
Leakage Rate	scch	1.0	> 1.0*
Maintained	minutes	S.	5
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Item Name: LO2 Chilldown	System Shutoff Va	lve	
Part Number: 1A49965-521	er og skalender fillskade for en en søkke til en skalende for en skalender kan en en skalender og skalender og		
Test Procedure Drawing No: 1	1077 83	Change Let	ter: C
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Actuator Port Pressure	psig	475	NA
Leakage Rate	scim	30 ,	N/A
Time Maintained	minutes	5	N/A
Actuator		uu espaalayajahka nooloonuun on missoosia, paha palajasi hoo ole analikka mii ka pama maan	and practical control of the control
Test Parameter	Units	Required	Actual
Actuator Port Pressure	psig	475	475
Specimen Temperature	°F	Ambient	62
Leakage Rate	scch	1.0	32,570-X
Maintained	minutes	5	5



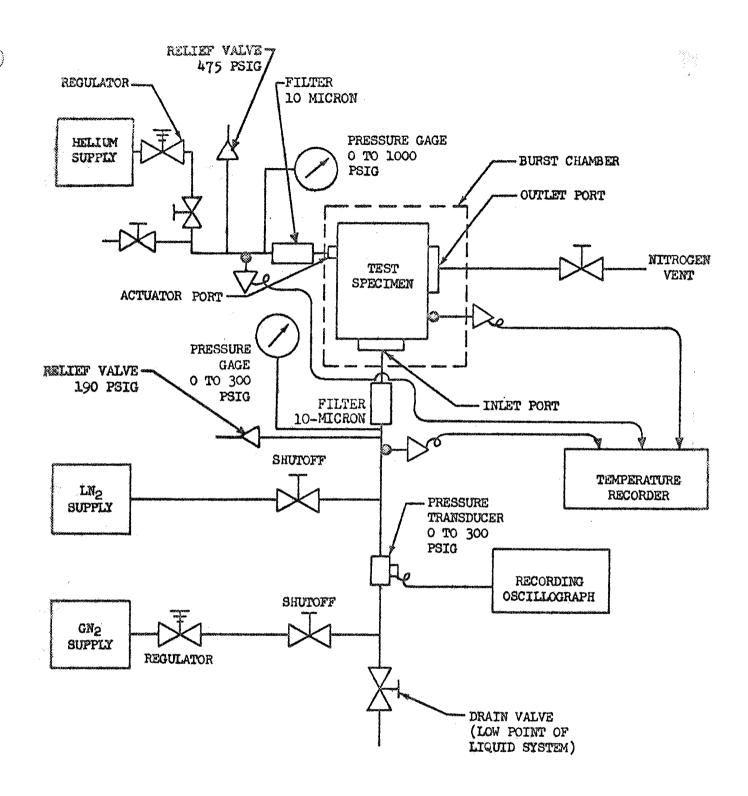


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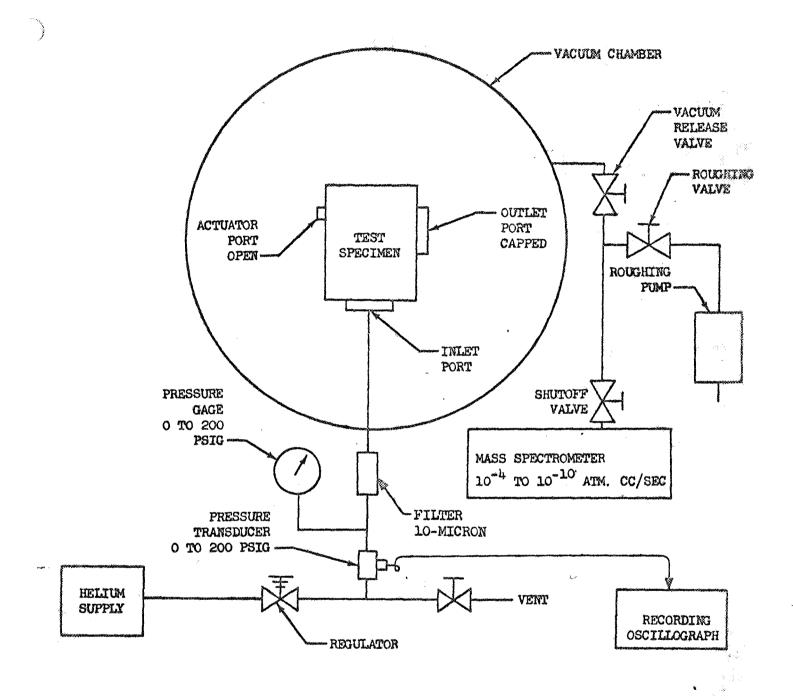


 ${\rm LO}_2$ Chilldown System Shutoff Valve, P/N 1A49965-521.

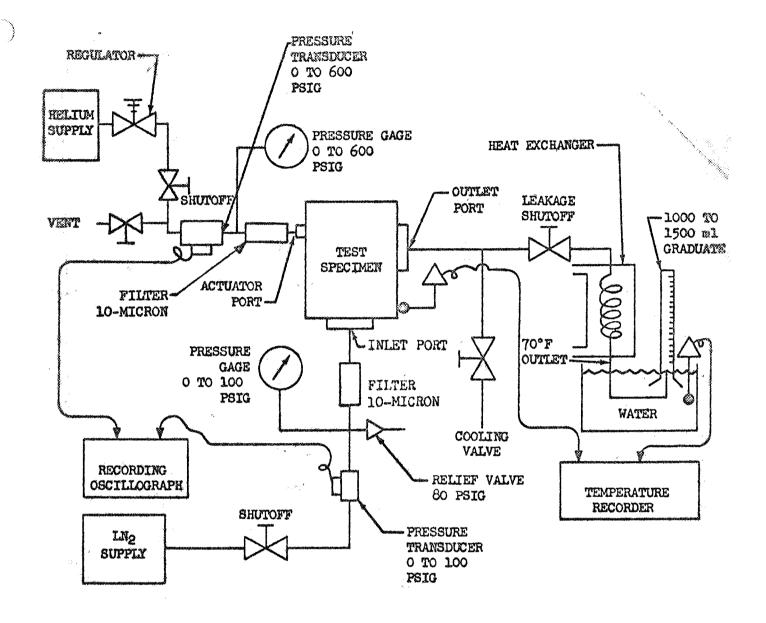
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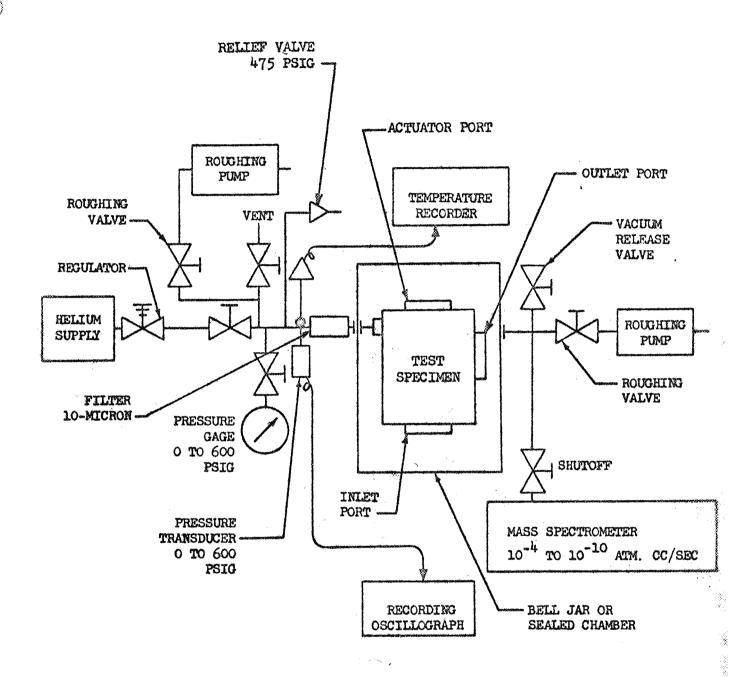


Proof Pressure Test, Schematic Diagram

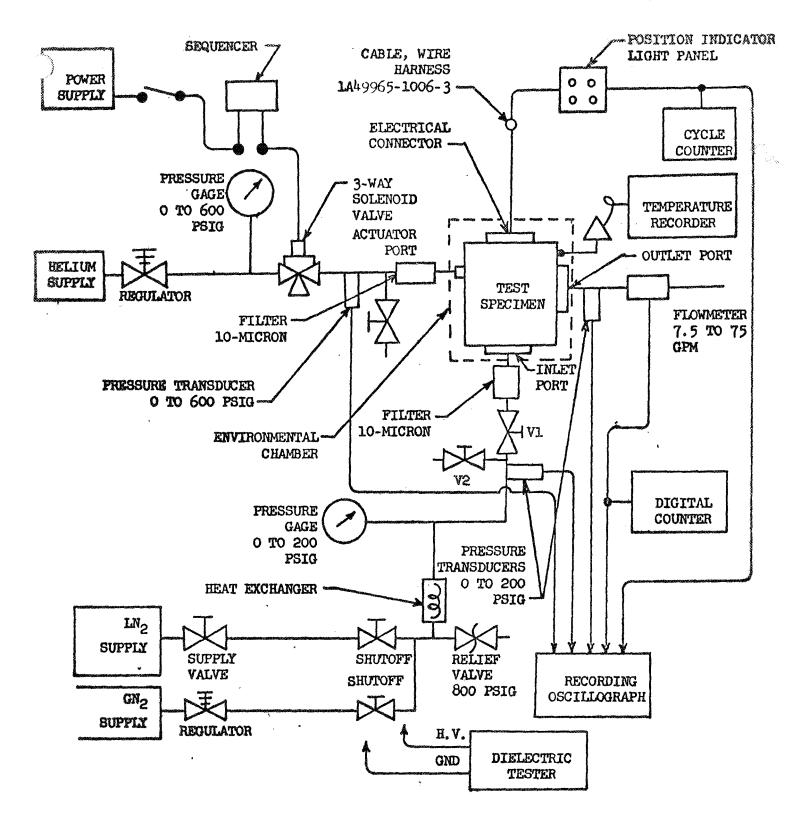


External Leakage Test, Schematic Diagram

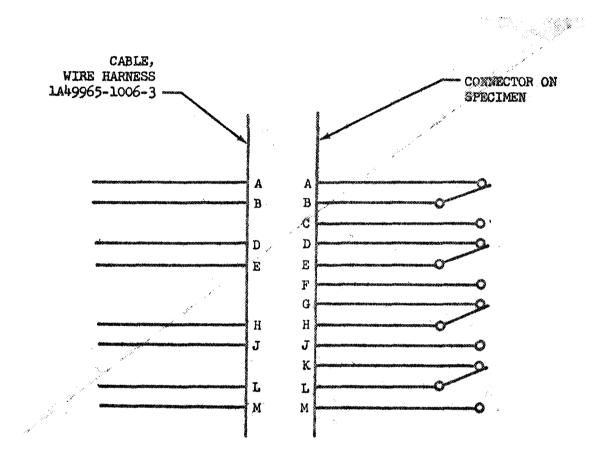




Actuator Internal Leakage Test, Schematic Diagram

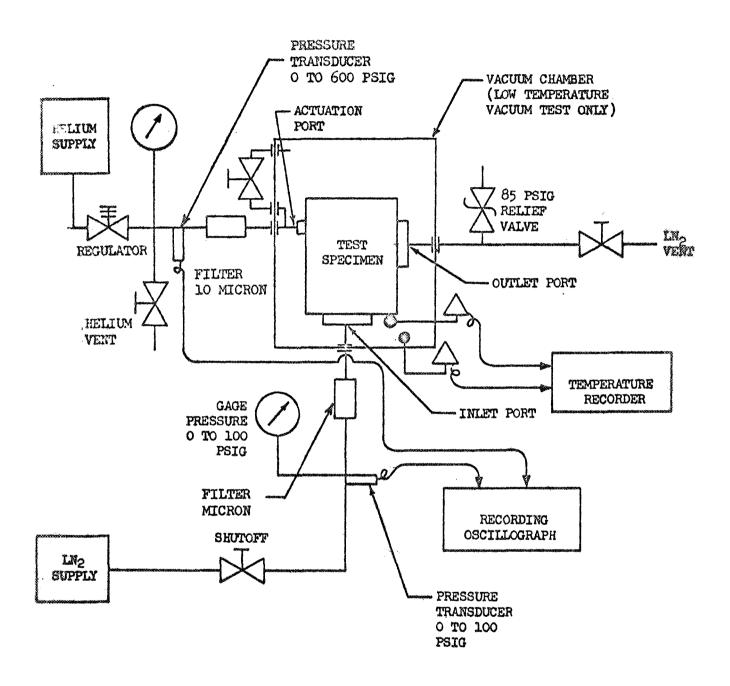


Functional Test and Repeat Cycle Tests, Schematic Diagram

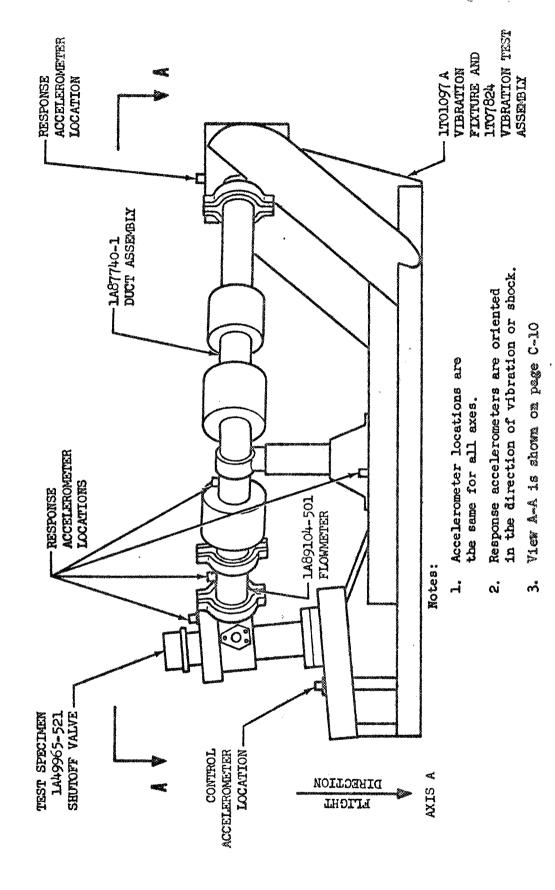


NOTE: SWITCHES ARE SHOWN FOR THE VALVE IN THE FULL OPEN POSITION

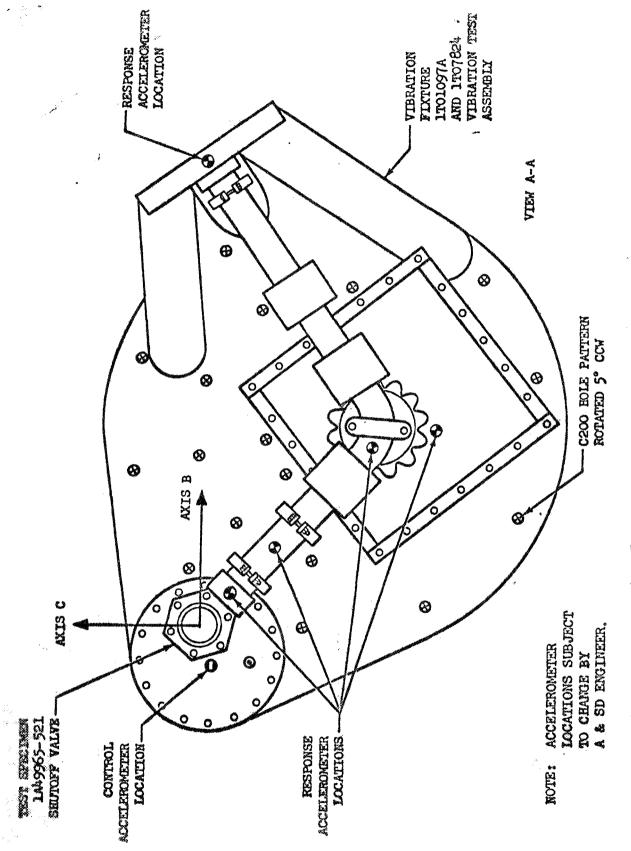
Electrical Connector Pin Assignment



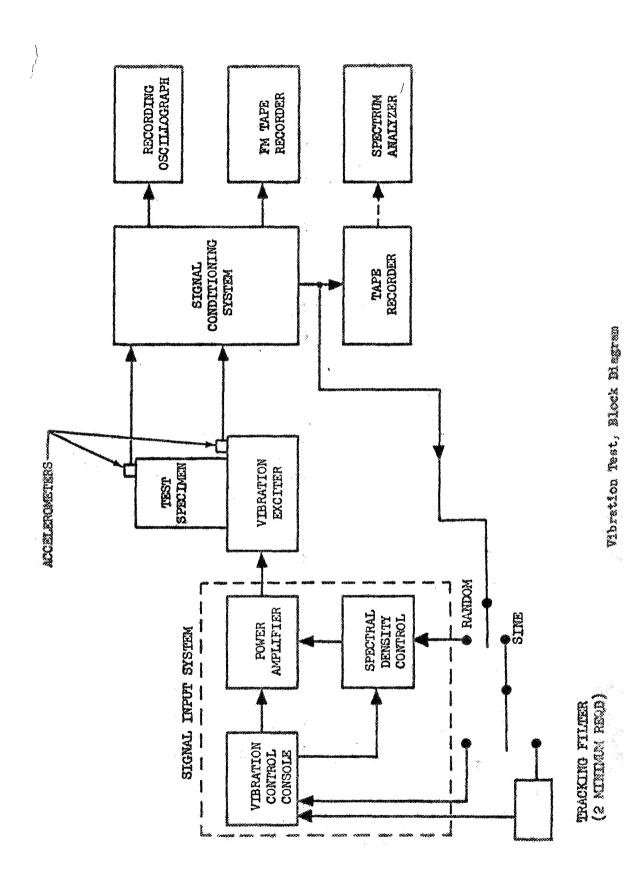
Low Temperature Vacuum and Vibration Test, Schematic Diagram

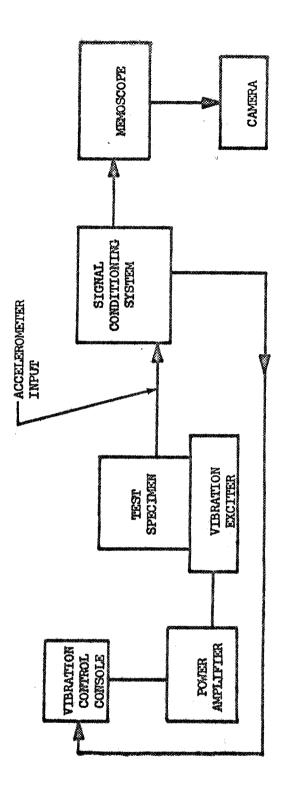


Axes Designation and Accelerometer Locations for Vibration and Shock Tests



Axes Designation and Accelerometer Locations for Vibration and Shock Tests, Tiew A-A





Shock Test, Block Diagram

ADDENDIM D FAILURE AND REJECTION REPORT: FAILURE ANALYSIS REPORT

200N X37-104 (REV. 9-54)		REJECTION REPORT (38-DEVAD-BEE-RE-98)
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	1105783	Cron 1-19/1 SP-CZ CUDE 12
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14. ECMBITION 15. PART OPERATING TIME .1 HOURS .2 CYCLES TEMPORARY HOR-CONFORMANCE 16. PURCHASE ORDER RO.	SEAL WAR	ELEAKAGE 18 15054
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.3 CONFORMING BUT UNSATISFACTORY		
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7660	wery 11-1-6	1/263616	5782	PAGE COPE

PAILURE ANALYSIS REPORT AL51137/1A49965-521 Lox Chill Down Valve 'Model DSV-4B

INITIATED: 10-31-66

COMPLETED: 12-2-66

FAILURE ANALYSIS COMPTTEE ACTIVITY COMPLETE 12-2-65
Date

A3-74/3
Reliability Assurance Dept.

Development Engineering Dept.

July 12/33
Development Engineering Dept.

W.W. Peaner 12-7-6

GOUGLAS MISSILE & SPACE SYSTEMS DIVISION

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INTERIM REPORT 1/9/66

A118 00 122 1004 4-261			ď.,
(A. PTINT) DATE & DAC MODEL	A HAMUPACIUMANA PANT MO. \$	C/L STAIRL NO. 13 Property	1
"" 14 3 6 Day-4	B 1A45965-521	0201	
DAU PRUL INSMENT UNAWING 18	PART MANUFACTURERS WANG	PART HANS	٦
1A49955	Fairchild-Hiller	Lox Chill Down Valve	
	AILURE ANALYSIS REPORT	ESTABLISHED CAUSE 14	and distance and the
	BILE & GPACE BYBIEMS DIVISIDIV IRM 60.732 IREV. 9.821	MANUFACTURING	-
Coordinated with A. Loupe,	A-863	CZZ MISUSK	ij

A FAILURE HISTORY: Formal Qual Test Part, Item No. FQFI4A, Type 6.

During Test Per SCD #1A49%5 and TPD #1T07783, the Micro Switch Cover Scal Leaked at the rate of 570 SCCM; Maximum leakage allowable is one SCCH. Unit has been subjected to: Pre-Test Inspection, Proof and leakage processes; Functional including Electrical Tests, for Test Tests. Vibration and Post Vibration and Mechanical Shock Test.

For reference to earlier failures, See FRR Supplement.

B INSTRUCTIONS FOR ANALYSIS:

- (1) The Supplier shall conduct a Mailure Analysis to determine failure mechanism and cause. A Douglas MSSD Development Engineering Representative shall witness the Failure Analysis. Completion of this analysis is required prior to 11-14-66.
- (2) Test to verify malifunction. Disassemble as required to determine the cause of failure. Evaluate and record all findings.
- (3) In the event the failure mechanism, per this Analysis, is attributed to contamination (foreign material), then supporting evidence shall be submitted as a part of this Analysis, as to the nature, particle size, and particly count of material preventing performance of the unit within specification. If Supplier does not have capability for such Analysis, the suspect material should be collected, identified as to area and location found, and forwarded to DAC referencing this report number.
- (5) When the Analysis indicates that Supplier Action is required to prevent recurrence of noted discrepancies, a positive course of action shall be noted in Itme E by Supplier.
- (6) Comply with Pailure Analysis REquirements of 1A86975 Reliability Requirements Specifications.

INTERIM REPORT 1/9/66

TIAM 60-738-1 IREV. 11 8	3)	SERIAL HO.	PART 2
7151137	SUPPLEMENTAL FAILURE ANALYSIS REPO	OS07 0507	13
	Spuslas mizble & epace systems division Form 60-728 (rev. 8-82) (Continued)		
and the second s			enterna enterna enterna en entern En enterna en enterna
B Instruction	S-room-muso): RS FOR ANALYSIS Con't.	.*	
(7) Return t	ne completed report to: Douglas Aircraft		.*
	3000 Ocean Park Santa Monica, Ce		• :
	Attn: W. C. Jer		•
(8) Pailure A	anlysis Unit cocrainate Auslysis with J.	. Hogen A3-863.	Eco. 2537
	\(\int_{i}\)	Pelost.	151
	AUTHORIZED BY	men -	_procedupt./4
CONCLUSIONS:	Failure	lng Liaison Analysis Unit, Ext.	3982
	LYSIS: The unit was disassembled and test		ovember, in the
	A.C. personnel Jack Hogan, Dick Starr, as was removed from the valve and tested a		nraggura
	ed at the gasket of the switch cover.	o' . oo board about hos	
The inner-bell	ovs was separated from the assembly and		
	he bellows submerged in alcohol. Leakag	e occurred at the O	D. of convo-
,	rts were given to Mr. Hogan for the purp	ose of obtaining ad	equate photo*
graphs. These	photos show the flat spot and cracks at	the point of leaks	
	signed to the valve for assembly, test,		;
	following persons met at the bellows ve	ndor, Aeroflex. DA	C personnel,
	eroflex personnel, Clarence Ross, Chief	Engr, Dale Van Wink	le, Q.C. Mgr.
XVXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	IX Stratos personnel, Roy Smith, Reliabil	ity Engineer.	•
Manufacturing	and Q.C. processes were thoroughly revie	wed. A shop tour v	as conducted
and processing	was described. The inner bellows was c	ut apart longitudir	ally disclosing
	convolution of the inner ply, and a sma		
	he outer bellows was removed from the hou old of the outer ply. Evidence was found		
	D. of each bellows and the adjacent encl		re arrRue coneg
चिक्र कराच्यात व्यक्त कर्	By		Data
The cause of i	the flat spot, cracks, and leakage at the positively assigned. Possibilities a	inner bellows coul	ld not be
anclosure 2)	minor damage during fabrication. It was	re, 1/ rubbing on t	ne adjacent
	ed during visual inspection and that thin		
	tection of the craters questionable,	F	
Projected Act	one:		·
•	vill submit revised procedures for approv	al. Revision will	include closer

visual inspection at increased magnification.

D.A.C. (J. Kumagai) will conduct electropymicroscope examination and metallurgical

information will be submitted when available. V

analysis of the discrepant parts.

INTERIM REPORT.

TM-D3V4B-D3V-R59

Supplemental failure analysis report

SAMAL NO.

PERE DES "I PART'S

Results of microscopic/metallurgical analysis conducted at D.A.C. by J. Kumagai, Meterials & Process Engineer.

- 1. Analysis disclosed that the failed convolution had made contact with the wall of the bellows enclosure during the vibration test. Contact resulted in plastic deformation of the convolution and produced the observed flat spot. Subsequent operation of the valve induced the cracks which propagated from the flat spot.
- 2. Investigation of test records disclosed that, during the sine sweep from 5 to 1000 cps. the applied g-load in the radial direction was approximately twice the value required by specification. It was also determined that the alignment of the excessive g-load coincided with the circumferential location of the flat spot on the convolution.
- CONCLUSIONS:

The failure resulted from application of excessive g-load during vibration at the test facility.

- ACTION TAKEN:
 - No action required by Stratos on the basic cause of failure.
 - Tightening of inspection at and by bellows vendor, Aeroflex, is in process of instigation. Final submittal of this SFAR will be made as soon as the revised procedures have been fully defined and approved and the effectivity has been identified. MAmit 11/16/66

Ä151137

SUPPLEMENTAL FAILURE ANALYSIS REPORT

DOUGLAS MISSILE & SPACE SYSTEMS DIVISION FQ8M 60-732 (REV. 9-62) (CONTINUED)

SERIAL NO. TOTAL

0201

C FAILURE ANALYSIS (CONTINUED):

See Attached Sheets

.		DATE	
3-1	The state of the s	DHIL	

D CONCLUSIONS:

Poor quality control on the part of the bellows manufacturer was initially thought to be the major contributing factor in the bellows failure, however, the results of the metalurgical analysis performed by MR&PM on the failed bellows assembly has revealed that the inner bellows did, in fact, contact the wall of its container during vibration. Microscopic examination of the deformed convolute in the middle of this bellows showed evidence of fretting and plastic deformation as the result of contact with the container.

The bellows container was sectioned in two and examined under magnification. The distance from the end and the location of the bellows deformed convolute coincided with the marks found in the container.

The orientation of the damaged bellows convolution and the container marks coincided with the radial axis "B" of vibration. Examination of the vibration test data indicates over vibration beyond specification by 70 to 100 % in radial axis "B". This overvibration occurred during the sinusoidal up sweep from 100 to 1000 cps due to the low temperature response of the control accelerometer (see attached graph of accelerometer #3 and #4 up sweep vs down sweep 100 to 1000 cps).

It is evident that the overvibration levels were responsible for this bellows failure based on the examination of the valve, valve bellows and the review of these vibration test data.

E ACTION TAKEN:

Corrective action was taken to replace the accelerometer with one of the proper type.

This test specimen valve body for FQ-F14A has been refurbished with a new bellows assembly and has successfully completed life cycle and vibration at Beech Colorado.

Fl4 Fuel Shutoff Valve has also completed both life cycle and vibration with the same bellows configuration.

FILC is equivalent to the 1A49965-519 IM, Chillown hautoff Valve.

File is equivalent to the 1A49965-519 IM2 Chill Fyoton Shutoff Valve.

FIGA is the 1Ab9965-521 LO, Chilleown Shutoff Valve, the only difference being in the body casting configuration.

FQ-F14A was subjected to overvibration in the sine sweep at 5-1000 cps by a factor of 2. This was due to an accelerometer that would not take the -300°F temperature. The overvibration was in the direction of axis "B".

France Sein inch. e.co.

Copies to:

RECORD OF DISCUSSION

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RECORD OF DISCUSSION ROD # C17

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P. Chart, Mario.

D. Fock, At-Dis

C. W. Manager, 13-863

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Ald. Fant. A-813

J. Hammad, A3-967

11-18-66

CHILL SYSTEM SHUTOFF VALVE (F14A)

PERSON OR COMPANY CONTACT J. Law, A3-863; J. Kumagai, A3-263 Inner Bellows Failure of F14A S/NO201

Ref: FARR #A151137, Memorandum A3-860-KCEO-M-795; A3-860-KECG-M-BOD #575 and ROD-AFD2-0097

on the failed bellows assembly has revealed that the inner bellows did, in fact, contact the wall of its container during vibration. Microscopic examination of the deformed convolute in the middle of this bellows showed evidence of fretting and plastic deformation as the result of contact with the container.

The bellows container was sectioned in two and examined under magnification. The distance from the end and the location of the bellows deformed convolute coincided with the marks found in the container.

The orientation of the damaged bellows convolution and the container marks coincided with the radial axis "B" of vibration. Examination of the vibration test data indicates over vibration beyond specification by 70 to 100 % in radial axis "B". This overvibration occurred during the sinusoidal up sweep from 100 to 1000 cps due to the low temperature response of the control accelerometer (see attached graph of accelerometer #3 and #4 up sweep vs down sweep 100 to 1000 cps).

It is evident that the overvibration levels were responsible for this bellows failure based on the examination of the valve, valve bellows and the review of these vibration test data.

Based on this failure analysis redesign will not be considered.

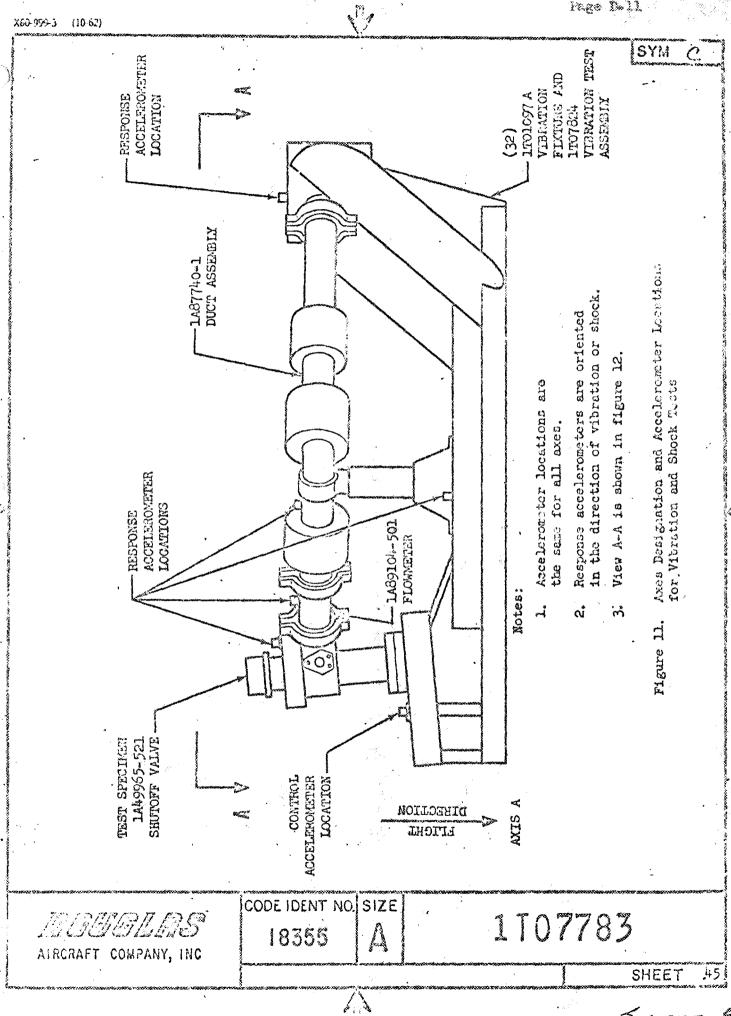
This test specimen valve body for FQ-FIAA has been refurbished with a new bellows assembly and has successfully completed life cycle and vibration at Beech Colorado.

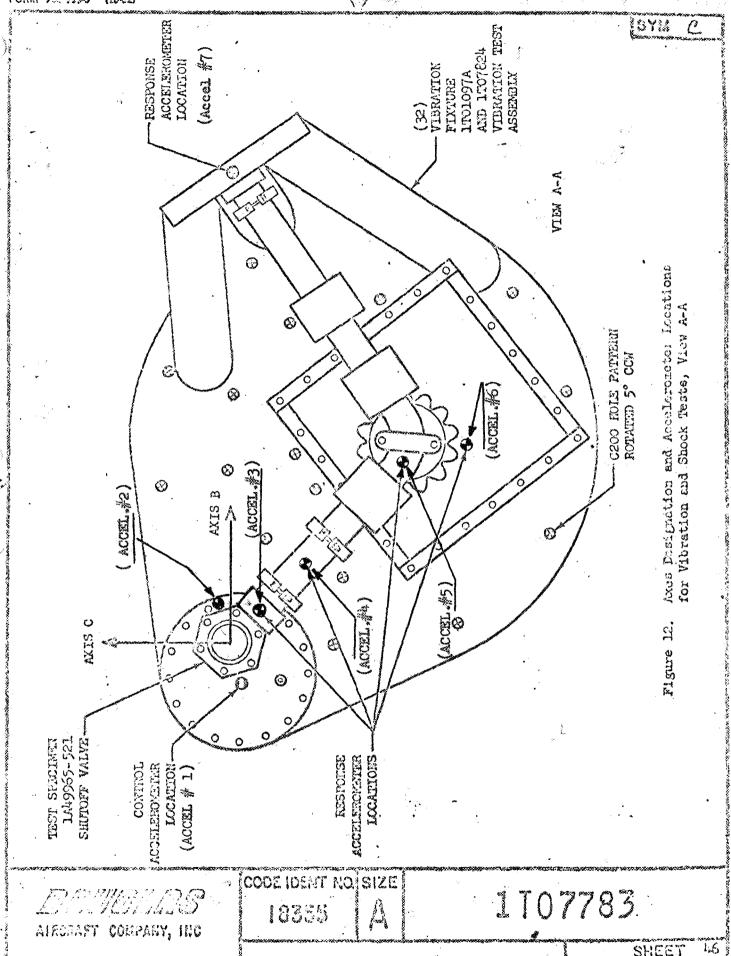
Pl4 Fuel Shutoff Valve has also completed both life cycle and vibration with the same bellows configuration.

J. Hogan / Propulsion Design V

Saturn Propulsion Department

W. ...





B

SHEET

Accel # 1 Us weep _ DOWNSING frequency (cps)

KADIAL AXIS

TANDARD-ENV-H592L Fage D-12 Nev. A FQ-F14A 10-28-66

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FREQUENCY (cps)

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Test Equipment List

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Test Plan Line Item: FQ-F-148	Test Eculoment	Name	Pressure Cage	Pressure Gage	Pressure Gaga	Transducer	Trensducer	Transducer	Differential Pressure Transducer	Flometer	Temperature Recorder	Terporature Recorder

TM-DSV4B-FNV-R5924 Page E-2

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Test Plan Line Item: FQ-F-144	Test Equipment	Name	Oscillograph Recorder	Oscillograph Recorder	Tape Recorder	Charge Amplifter	Charge Amplifier	Meter, True RE	Digital Voltmeter	Differential D. C. Voltaeter	atstone	Typot .

Test Equipment List

Sheet 2 of

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Test Equipment List

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Name	Model No.	Teg No	Renge	Acouracy	Lest	Fext
Negger	General Radio	6	0~200		Annual Control of the	
Bridge Balance	Beech Aircraft Company		13/A	27/A		
D.C. Power Supply	Sorenson Nobstron 83-36-30	ľ∞18	805-0 & V 05-0	#/#		
Leak Detector	Veeto NEGAB	MS412	10 ⁻⁴ to 10 ⁻¹⁰ std. oc He/seq	1+10%		
Leak Detector	Veeco MSGAB	MS11223	16 ⁻¹ to 10 ⁻¹⁰ std. cc He/sec	410%		
Environmental Chamber	Consolidated Vacuum C. E. Howard, 304	8581	-300 to +4goof Atm to 10 ⁻³ mm Hg	N/A		
Ionization Vacuum Gage	Varian 9730003	1060	10 ⁻¹⁴ to 10 ⁻¹¹	10%	<u> </u>	
Vsewum Monitor	Varian G-11A	6855	0-10	+1/2%		pocheconición i angelemente
Mechanical Vacuum Pump	W. M. Welch Duo-Seal	24529	1 x 10 hm Hg	1 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 /		(d.)//gamman.cgue.ga./b.japooo.
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Test Equipment List

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Sheet 5

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BOUGLAS D

DOUGLAS AIRCRAFT CO. INC. MISSILE & SPACE SYSTEMS DIVISION SANTA MONICA, CALIFORNIA

QUALIFICATION STATEMENT

	DE/Q	TEST
7	FORMA	LOUA

PROGRAM

Saturn

TEST PLAN AND ITEM NUMBER

FQ-F-14A DAC 56625

TEST PLAN LINE ITEM TITLE

SHUTOFF VALVE, LO, CHILLDOWN SYSTEM

PART NO. 1A49965-521Y 1A49965-521AA 1A49965-521-011AC

TECHNICAL MEMORANDUM NUMBER(S)

TM-DSV4B-ENV-R5924 (S/N 0201); TM-DSV-4B-(SSL)-PL-R-6092-2 (S/N 0206); TM-DSV4B-ENV-R5929 (S/N 0201; TM-DSV-4B-ENV-R6092-1 (S/N 0002, 0206); TM-DSV4B-PROP-R6092 (S/N 0002, 0206)

ENGINEERING RESOLUTIONS AND CONCLUSIONS

The LO₂ Chilldown System Shutoff Valve, P/N 1A49965-521 and -521-011, successfully met the requirements of TCD 1T07782, Revision J, when tested in accordance with TPD 1/T07783, Revision M, except as noted below:

A bellows failure was caused by vibration of 70 to 100% above required (-521)levels as a result of low temperature problem with control accelerometer. Retest with new bellows installed were satisfactory. (Ref. FARR Al51137)

An external leakage rate of 41.5 scch occurred during post vibration (1 scch max. allowable). The actuator subassembly screws were retorqued (-521)and retest was satisfactory. The flow test pressure drop was 0.31 psid; however, the limit was increased from 0.25 to 0.50 psid, maximum. Two position indication switches gave erratic talkback during tests. The -525 configuration (-521-011) incorporated an improved open switch actuator. Also, a higher reliability microswitch (1HM25) is now being (Ref. FARR A240388).

S/N 0206: A force of 34 pounds was required to move the actuator from normal (-521-011) unpressurized position to full open position; however, the limit was increased from 30 to 35 pounds. Excessive internal leakages up to

(USE CONTINUATION SHEET AS NECESSARY)

STATEMENT OF QUALIFICATION

Based on the Formal Qualification Test results presented in the attached report, it is the conclusion of the Douglas Aircraft Company, Inc., that the above item continues to be qualified for use as intended on the Saturn SIVB.

DESIGN TECHNOLOGY 5-16-68 P. S. F FOR D. D. Hofferth

Chief Engineer Saturn Propulsion

RELIABILITY ENGINEERING

ABM Stall

cation Statement.

age 2 FQ F-14A

ENGINEERING RESOLUTIONS AND CONCLUSIONS

(-521-011)

S/N 0206: 1600 scim (maximum allowable 100 scim) were noted during thermal vacuum test and post repeat cycle test. Leakage was attributed to a lip (a result of incomplete material removal during machining) on the inner diameter of the poppet seal. Replacement of the seal by DAC resulted in acceptable leakage when chilled down in closed position as in vehicle usage; however, leakage was still excessive when chilled down in the open position per test procedure. This seal lacked a truing cut usually performed on seal and retainer assembly prior to installation. Replacement with seal and retainer assembly having a truing cut corrected leakage problem. (Ref. FARR's A240391 and A240398).

> The -521-011 configuration has a redesigned switch actuator and a sealant on the switch cover and electrical connector and is identical to the -525 configuration.

Fa-F-14A